A dictionary of practical surgery: exhibiting the present state of the principles and practice of surgery / collected from the most authentic and oiginal sources of information ; comprehending also an account of the instruments, remedies and applications employed in surgery, and the etymoloy and signification of the principal terms. The whole illustrated by numerous interesting cases ... / By Samuel Cooper.

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A

DICTIONARY

OF

PRACTICAL SURGERY.

A

DICTIONARY

OF

PRACTICAL SURGERY:

EXHIBITING

THE PRESENT STATE

OF THE

PRINCIPLES AND PRACTICE OF SURGERY;

COLLECTED FROM

THE MOST AUTHENTIC AND ORIGINAL SOURCES OF INFORMATION:

Manchester COMPREHENDING ALSO Infirmary.

AN ACCOUNT OF THE INSTRUMENTS, REMEDIES AND APPLICATIONS EMPLOYED IN SURGERY, AND THE ETYMOLOGY AND SIGNIFICATION OF THE PRINCIPAL TERMS:

THE WHOLE ILLUSTRATED

BY NUMEROUS INTERESTING CASES, AND INTERSPERSED WITH A SERIES OF CRITICAL REFLECTIONS AND ORIGINAL OBSERVATIONS.

MANCHESTER INFIRMARY

THE SECOND EDITION,

MANCHESTER INFIRMARY

WITH MANY CORRECTIONS AND MUCH IMPORTANT ADDITIONAL MATTER.

BY

SAMUEL COOPER,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS IN LONDON; AND AUTHOR OF THE "FIRST LINES OF THE PRACTICE OF SURGERY," &c.

LONDON:

Printed by T. Davison, Whitefriars,

FOR JOHN MURRAY, ALBEMARLE-STREET; LONGMAN, HURST, REES, ORME, AND BROWN, PATERNOSTER-ROW; J. CALLOW, CROWN-COURT, PRINCES-STREET; AND T. UNDERWOOD, FLEET-STREET.

1813.

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DISCHARGE OF HIS HIGHLY IMPORTANT PUBLIC DUTIES, HAVE DESERVEDLY OBTAINED UNIVERSAL APPROBATION,

THIS NEW AND IMPROVED

EDITION OF A WORK, WHICH HAS FOR ONE OF ITS PRINCIPAL OBJECTS THE CONSIDERATION OF SUBJECTS CONNECTED WITH MILITARY SURGERY,

IS

MOST RESPECTFULLY INSCRIBED,

AS A TESTIMONY

OF UNALTERABLE GRATITUDE,

BY

MANCHESTER INFIRMARY

HIS VERY HUMBLE, OBLIGED,

AND DEVOTED SERVANT,

THE AUTHOR.

In charge of the Detachment Hospital,
Canterbury, Feb. 4, 1813.

PREFACE

TO THE

SECOND EDITION.

THE first edition of this Dictionary of Practical Surgery consisted of not less than three thousand copies, and these having been for some time past exhausted, I have been induced to undertake the very laborious task of revising the work, and making the necessary corrections and additions. This duty I have endeavoured to discharge with equal diligence and impartiality. Whoever considers the numerous valuable publications, from which I have drawn the information that is condensed in this volume; and reflects upon the character of the authorities generally quoted throughout the subsequent columns; will not withhold from me the humble praise of having shewn great industry, and proved myself an useful and indefatigable compiler.

This commendation I shall presume to indulge a hope of acquiring; but, with regard to the original remarks of my own, which are incorporated in the publication, I feel more diffidence, and it will fully satisfy my ambition, if this part of the work appear to the candid reader to have been executed with a becoming spirit for the investigation of truth.

As the title page sufficiently expresses the objects, which this Dictionary embraces, I shall not swell the preface with many remarks upon this head. There is one recommendation, however, which, I believe, the present work possesses *exclusively;* at least, I know of no system of surgery in our language, which offers the advantage alluded to, viz. that of concluding every subject with references to authors, from whom the most accurate information may be obtained. In the edition, now presented to the public, I flatter myself, the references will be found to be materially improved both in respect to accuracy and copiousness.

The inestimable memoirs on military surgery, recently published by the French Surgeon-general Larrey, perhaps, the most experienced army-surgeon, that ever lived, have attracted my earnest attention, and,

at every opportunity, I have taken care to incorporate in this Dictionary his highly interesting opinions and observations. The articles, *Amputation*, *Gun-shot Wounds*, *Mortification*, *Tetanus*, and a variety of others, have been materially enriched with matter selected from the productions of the distinguished M. Larrey.

Without presuming to build much on the merit of any of the observations, which belong to myself, I can feel no doubt, that the valuable information, brought into this Dictionary from the writings of such men as Pott, Sharp, White, Warner, Louis, Cheselden, Hunter, J. L. Petit, Richter, Lassus, Pelletan, Desault, Sabatier, Larrey, Scarpa, Home, Hey, Abernethy, A. Cooper, &c. &c. will continue to obtain for the work unabated indulgence and patronage.

That defects still exist in the book, I am fully aware of; and that some of the articles yet stand in need of being altered, I am ready to acknowledge; but, a work like the present can be perfected only by degrees; the undertaking, indeed, would afford employment for a man's whole life.

DICTIONARY

OF

PRACTICAL SURGERY.

ABANET. A bandage resembling a girdle.

ABAPTISTON, or ABAPTISTA (from ἀ priv. and βάπτιζω, *immergo*, to sink under). Galen, Fabricius ab Aquapendente, and especially Scultetus, in his *Armamentarium Chirurgicum*, so denominate the crown of the trepan; or, in other words, the circular saw which makes the perforation in the bone, when the instrument is used. The term came into use, in consequence of this part of the trepan having had, at its first invention, a conical form, which kept it from penetrating the cranium too rapidly, so as to plunge the teeth of the saw in the dura mater and brain.—*Encyclopédie Méthodique; Partie Chirurgicale, art. Abaptiston.*

Whatever supposititious advantages the ancient practitioners of surgery may have imputed to the conical shape of the crowns of their trepans, certain it is, that modern surgeons do not, in general, adopt their notions on this subject; but, almost universally, make use of a circular saw, the figure of which is simply cylindrical.

Mr. Samuel Sharp notices the idea of there being the above danger in employing a cylindrical trepan, and remarks, that the great labour of working so slowly and difficultly (with a conical one) is not only very inconvenient to an operator, but by no means serviceable to the operation; for, notwithstanding the saw be cylindrical, and work without any other impediment than what lies before the teeth, yet, even with this advantage, the operation goes on so gradually, that, in all the experience which Mr. Sharp has had, he never found the least danger of suddenly passing through to the brain, if care be taken not to lean too hard on the instrument when the bone is almost sawn through. With respect to the impracticableness of inclining the cylindrical saw on any particular part of the circle, when sawn unevenly, (which was formerly alleged) whoever will try the experiment, will, in a moment, discover the falseness of the assertion. The very instance stated overthrows this reasoning; for, if the circle has already been made more deeply in one part than another, it must imply, that we have leaned with more force on one part than another, and, consequently, may at pleasure do the same thing again. Mr. Sharp next takes notice of the supposed advantage, which the conical saw had in receiving and retaining the piece of bone; a circumstance, which he, very properly, calls frivolous.—*Sharp on the Operations of Surgery.*

ABDOMEN. The BELLY. The term is said to be derived from the Latin verb *abdo*, to hide, because many of the chief viscera of the body are concealed in the cavity, which it denotes.

When a surgeon speaks of the cavity of the abdomen, he confines his meaning to the space, which is included within the bag of the peritoneum. Hence, neither the kidneys, nor the pelvic viscera, are, strictly speaking, parts of the abdomen.

Anatomists have distinguished this large cavity into different regions, and the terms, allotted to these, are so very frequent in the language of surgical books, that some account of them in this Dictionary seems indispensable.

The middle of the upper part of the abdomen, from the ensiform cartilage, as low down as a line drawn across from the greatest convexity of the cartilages of the ribs, is called the *epigastric region.*

The spaces at the sides of the epigastric region are termed, the *right* and *left hypochondria*, or *hypochondriac regions.*

The *umbilical region* extends upward to the line, forming the lower boundary of the epigastric region, and downward, to a line drawn across from one anterior superior spinous process of the ilium to the other.

All below the last line, down to the os pubis, is named the *hypogastric region.*

The abdomen is a part of the body claiming the particular attention of every practical surgeon; for, it is the frequent situation of several of the most important surgical diseases. It is also very much exposed to wounds, and various operations are often requisite to be done in different parts of

it. One of the most common afflictions, to which mankind are subject, is that in which some of the bowels are protruded, pushing out before them a portion of the peritoneum. This disease is called *hernia*, and ought to be well understood by every practitioner who, however, can never acquire the necessary knowledge, without being well acquainted with the anatomy of the abdomen. In dropsical cases, it is frequently proper to tap the abdomen, and this operation, named *paracentesis*, simple as it may seem, requires more consideration, and attention to anatomy, than surgeons often bestow on the subject. But the abdomen is, above all things, exceedingly liable to be wounded, to which case we shall confine our present remarks, referring the reader to *Hernia* and *Paracentesis* for information on these particular subjects.

WOUNDS OF THE ABDOMEN.

In these cases, we find, that the chief cause of danger is the tendency of the peritoneum to inflame. Every wound of the belly is apt to excite this inflammation, and every inflammation, however slight, is prone to spread, to extend itself over all the viscera, and to terminate in gangrene and death.

There are (says Mr. John Bell) a thousand occasions, on which this delicacy of the peritoneum may be observed; the wound of the small sword, and the stab of the stiletto, explain to us, how quickly the peritoneum, and all its contained bowels, inflame from the most minute wound, although it be almost too small to be visible on the outside, and scarcely within; for, often, upon dissection, no intestines are seen to be wounded, and no feces have escaped into the abdomen. In those, who die after lithotomy, we find the cavity of the peritoneum universally inflamed. The operation of Cæsarean section is fatal, not from any loss of blood, for, there is little bleeding; nor, from the parts being exposed to the air, for, patients also die, in whom the womb bursts, and where the air has no possible opportunity of insinuating itself; but, the case proves fatal from the inflammation, which is always disposed to originate from wounds of the peritoneum, small as well as great. (*Discourses on the Nature and Cure of Wounds, p.* 310, *edit.* 3.)

But, although there can be no doubt, that the wound, abstractedly considered, is the most frequent occasion of this dreaded inflammation; yet, it sometimes happens, that the inflammatory consequences must be ascribed to another kind of cause. If an intestine be wounded, its contents may, under certain circumstances, be effused in the abdomen; if the liver, spleen, kidney, or any large vessel be injured, blood may be poured out among the viscera; if the gall bladder be wounded, bile may be effused; and, if the bladder be pierced, the urine may escape into the abdomen. Now all these extravasated fluids are extraneous substances, with respect to the surfaces, with which they have come into contact, and usually give rise to inflammation of the peritoneum and viscera. I must not, however, prematurely allude to subjects, which will more properly fall under future consideration.

Wounds of the abdomen are divided, by almost all writers, into such as penetrate the cavity of the abdomen, and into others, which only interest the skin and muscles.

The former differ very much in their nature, and degree of danger, according as they do, or do not, injure parts of importance, contained in the peritoneum. The latter are not very different from the generality of other superficial wounds. The chief indications are to lower inflammation, and to prevent collections of matter. A few particularities, however, in the treatment of superficial wounds of the abdomen, seem to merit attention.

SUPERFICIAL WOUNDS.

The most ancient surgeons, and their successors, regularly up to the present day, have recorded, that wounds of tendinous parts are more perilous, than those of fleshy ones. Almost the whole front of the abdomen is covered with tendinous expansions, and, on this account, it is not unusual to see wounds in this situation followed by great local inflammations, and the formation of abscesses. The patient is, at the same time, affected with a great deal of the sympathetic inflammatory fever. (See *Fever.*) When the tension and swelling of the abdomen abate, shiverings sometimes occur, and indicate the occurrence of suppuration.

The matter, which forms in these cases, sometimes makes its way into the tendinous sheath of the rectus muscle, and, when the collection of matter in this situation remains undiscovered until a pointing appears, no sooner does the abscess burst or is it opened, than an extraordinary quantity of matter is discharged. The surgeon should carefully remember the nature of this kind of case, as there is frequently no alteration in the appearance of the integuments to denote, either the existence, or the extent, of the suppuration.

This kind of abscess forms one remarkable exception to the excellent general rule of allowing acute phlegmonous abscesses to burst of their own accord. In the present instance, there is an aponeurotic expansion, intervening between the abscess and the skin, and nothing retards the natural progress of the matter to the surface

of the body so powerfully, as the interposition of a tendinous fascia. But, even in this circumstance, the propensity of pus to make its way outward is often seen to have immense influence. Though there is only a thin membrane, (viz. the peritoneum) between matter so situated, and the cavity of the abdomen, yet, in time, the abscess mostly points externally.

The proper treatment of this case is to prevent the surprising accumulation of matter, and rapid increase of mischief, by making a depending opening, sometimes at the very lowest part of the sheath of the rectus muscle, and this, as soon as the lodgment of matter is clearly ascertained.

The matter sometimes forms between the external and internal oblique muscles, and spreads most extensively. The pus may even insinuate itself into the abdomen, and the case end fatally. Such an example is recorded by Dr. Crowther, of Wakefield. In this instance, however, the disease proceeded from a contusion, not a wound. (See *Edinb. Med. and Surgical Journal, vol. ii. p.* 129.)

Superficial wounds of the abdomen are to be treated on the same principles, as similar wounds in other situations. The indications are to prevent inflammation as much as possible, and, if suppuration should be inevitable, to let out the matter by a depending opening, as soon as the abscess is known to exist. The inflammation is to be checked by general and topical bleeding, low diet, emollient clysters, diluent beverages, quietude, and the mildest, and most simple dessings. (See *Inflammation.*)

Whenever the abdominal muscles are wounded, it is desirable to relax them; but, this object should not lead us to put the patient out of a horizontal position. A very important point, in the treatment of wounds, which interest the parietes of the abdomen, is to afford a certain degree of support to the wounded part, when there seems the smallest chance of their being too weak to resist the pressure of the viscera. The parietes of the abdomen are almost wholly composed of soft parts, which easily yield. No part of the front, or sides, of the abdomen, is supported by the stability of a bony structure, and, as the viscera are, for the most part, more or less moveable, and closely compressed by the abdominal muscles, and diaphragm, they are extremely liable to be protruded, whenever the resistance of the parietes of the abdomen is not sufficiently potent. Thus very perilous cases of herniæ may originate.

For the above reasons, all wounds of the abdomen, especially those, in which both the integuments and muscles have been cut, demand strict attention to the precaution of supporting the wounded part, and this, though the peritoneum itself should not happen to be divided. The patient ought to keep as much as possible in a horizontal position, while suitable compresses and bandages should be applied to the situation of the wound. In order to guard against the occurrence of hernia, the part should be supported, in this way, a considerable time after the wound is healed.

The peritoneum being connected by means of cellular substance, with the inner surface of the abdominal muscles, there is always some risk of the inflammation of these muscles extending to the membranous lining of the abdomen. This occurrence must be averted by the rigorous employment of the antiphlogistic treatment. What renders the event still more dangerous is, that when one point of the peritoneum is affected, the inflammation usually spreads with immense rapidity over its whole extent, and too often proves fatal.

As superficial wounds of the abdomen are to be treated on the general principles, applicable to all other wounds of this sort in other situations, it is hardly necessary to state, that union by the first intention is always, when possible, to be attempted.

OF WOUNDS PENETRATING THE CAVITY OF THE ABDOMEN.

In these cases, the first thing, which the surgeon is generally anxious to know, is, whether the wound penetrates the cavity of the abdomen, and whether any of the viscera are probably injured.

When the wound is extensive, and any of the bowels protrude, the first part of the question is at once decided. But, when the wound is narrow, and allows none of the viscera to protrude, it is often exceedingly difficult to ascertain, whether the injury extends into the abdomen, or not. An opinion, however, may usually be formed, by carefully examining the wound with one of the fingers, or a probe, after having put the patient, as exactly as possible, in the posture in which he was at the time of receiving the accident; by observing, if possible, the shape and dimensions of the instrument, with which the injury was done; how much of the weapon has entered the flesh; the direction in which it was pushed; by attending to the quantity of blood, which the patient has lost, the state of his pulse, &c. and, lastly, by observing, whether there is any discharge of bile, feces, or other fluids, known to be naturally contained in some of the abdominal viscera.

When the wound is sufficiently large to admit the finger, we may always ascertain whether the injury extends into the cavity

of the abdomen, because the viscera may then be easily felt. There is only one chance of deception, and that arises from a possibility of the practitioner's mistaking the inside of the sheath of the rectus muscle for the cavity of the peritoneum. When the examination is made with a probe, we should be particularly cautious in forming a judgment; for, the parts are so soft and yielding, that a very little force will make the instrument pass a considerable way inward. Every examination of this kind should always be undertaken, if possible, when the patient is exactly in the same position, as he was at the time of receiving the wound.

Injections have been employed for ascertaining, whether wounds penetrate the cavity of the abdomen. This absurd experiment, however, has now been most justly exploded from practice. It is well known to the moderns, that the space termed the cavity of the abdomen, is, in fact, completely filled with the various viscera, and that a fluid would, in general, not so easily find its way into the bag of the peritoneum, as an unreflecting person might suppose. If the injection were propelled with much force, it would be quite as likely to insinuate itself into the cellular substance of the parietes of the abdomen, or, perhaps, into the sheath of the rectus muscle. The least tortuosity of the wound, or a piece of bowel, or omentum, lying against the internal orifice of the injury, would completely prevent an injection from passing into the abdomen.

When a considerable quantity of blood issues from a wound of the abdomen, we may pronounce, almost with certainty, that some large vessel, within its cavity, is injured. Excepting the epigastric artery, which runs on the forepart of the abdomen, along the inner surface of the rectus muscle, there is not one very considerable vessel, distributed to the muscles, and integuments. At the same time, it is deserving of particular notice, that a very large artery may be opened in the abdomen, and, yet, not a drop of blood may be discharged from the external wound. A copious quantity may accumulate in this manner, even without there being any palpable swelling of the belly.

In such cases, the subsequent symptoms very quickly lead us to suspect what has happened. The patient complains of extreme debility and faintness; his pulse faulters; he has cold sweats; and, if the bleeding should not speedily cease, these symptoms are, in general, soon followed by death.

Sometimes, the first glimpse is enough to shew, that the wound extends into the cavity of the abdomen. The event is indicated by the escape of chyle, bilious matter, feces, or other fluids, known to be contained in some of the viscera. The same information may also be obtained from seeing a considerable quantity of blood vomited up, or discharged by stool. The urine, however, may flow from a wound, which does not actually penetrate the abdomen, for the kidneys, ureter, and bladder may be said to be out of the abdomen, because they are really on the outside of the cavity of the peritoneum.

When no symptoms of the above description occur, when neither the finger, nor probe, can be introduced; when none of the fluids, known to be contained in the various receptacles in the abdomen, are emitted from the wound; when the pulse remains natural, and the pain is not excessive; there is reason to hope, that the wound has not injured parts of greater consequence than the integuments, and muscles. (*Encyclopédie Méthodique, Partie Chirurgicale. Art. Abdomen.*)

We have now taken a survey of such criteria, as are commonly noticed by surgical writers, for the purpose of instructing the reader how to discriminate a wound which has penetrated the abdomen, from one which has not. It is our next place to warn the practitioner, that too much solicitude to determine this point, is very frequently productive of serious harm. It may be set down, as an axiom in surgery, that, *whenever the probing of a wound is not rendered absolutely necessary by some particular object in view, it may, in general, be judiciously omitted.* A narrow, oblique wound may enter the cavity of the abdomen, without there being any particular method of ascertaining, whether it has done so, or not. This, however, is of no practical importance; for, when there are no urgent symptoms, evincing the nature of the case, the treatment ought obviously to resemble that of a simple wound; and whether the wound is deep, or superficial, the antiphlogistic treatment is equally indicated.

The edges of a wound penetrating the abdomen, but, unattended with any obvious injury of the viscera, are to be brought together with sticking-plaster, just in the same way as common wounds. In this situation, sutures are more frequently proper, than in most others. Particular care is also to be taken to keep the bowels from protruding, by the application of a compress, and bandage. All the means of preventing inflammation are to be adopted, (see *Inflammation*) and quietude is, above all things, to be enjoined.

Our good old surgeon Wiseman (observes Mr. John Bell) has said with great simplicity, as a great many have said after him, "Thus, it frequently happeneth, that a sword passeth through the body, without wounding any considerable part." He means, that a rapier, or ball often passes quite across the belly, in at the

navel, and out at the back, and that without one bad sign, the patient recovers, and as has very often happened, walks abroad in good health, in eight days; which speedy cure has been supposed to imply a simple wound, in which all the bowels have escaped. But, we see now, *how* this is to be explained; for, we know, that in a thrust across the abdomen, six turns of intestine may be wounded,—each wound may adhere; adhesion, we know, is begun in a few hours, and is perfected in a few days; and, when it is perfect, all danger of inflammation is over; and, when the danger of inflammation is over, the patient may walk abroad; so that we may do, just as old Wiseman did in this case, here alluded to,* "Bleed him, and advise him to keep his bed and be quiet." In short, a man, thus wounded, if he be kept low, has his chance of escaping by an adhesion of the internal wounds." (*Discourses on the Nature and Cure of Wounds, p.* 329, 330, *edit.* 3.)

When a man is stabbed, or shot in the belly, the surgeon can seldom do any good by being very officious; and the wisest conduct, that he can in general adopt, is to keep his patient as quiet as possible, have recourse to bleeding, prescribe anodynes, and the lowest fluid diet, and content himself with applying superficial dressings. In the event of severe pain and swelling of the belly coming on, leeches, fomentations, and emollient poultices will be necessary, and nothing will now avail, except the most rigorous antiphlogistic means.

INFLAMMATORY CONSEQUENCES OF WOUNDS OF THE ABDOMEN.

Sometimes, notwithstanding the best treatment, alarming symptoms cannot be prevented. At first, these are commonly of the inflammatory kind; consequently, repeated bleeding, and redoubled attention to every part of the antiphlogistic treatment, are indicated. If the inflammation should not be subdued by such measures, internal mortification and death may follow, or abscesses form in the abdomen.

SUPPURATION IN THE ABDOMEN, IN CONSEQUENCE OF WOUNDS.

Abscesses within the bag of the peritoneum are far from being common occurrences. As a late writer well observes, "the containing and contained parts of the abdomen present to each other a uniform and continuous surface of membrane. This membrane is of the serous class, and the species of inflammation, to which it is especially subject, is that, which has been denominated the adhesive. The membrane lining the intestinal canal, is of the mucous class, and the ulcerative inflammation is the species, to which this class is liable. This beneficent provision is an irresistible evidence of the operation of a salutary principle in disease. If the inflamed peritoneum had run directly into suppuration, ulceration of the surrounding parts would have been required for an outlet; and if the internal surface of the irritated bowel had tended to form adhesions, the canal would have been in constant danger of obliteration." (*Travers on Injuries of the Intestines, &c. p.* 10.)

That collections of matter, however, do sometimes take place in the cavity of the abdomen, in consequence of wounds, is a fact of which there are too many proofs on record, for the possibility of the case to be doubted. At this moment, be it sufficient for our purpose to refer to two examples of the occurrence, as related by Mr. Benjamin Bell, in his System of Surgery, vol. v. p. 256.

If the abscess were in any other part of the body, and did not readily point, the wisest practice would undoubtedly be to make an opening sufficient for the evacuation of the matter. But suppuration in the abdomen can seldom be ascertained with certainty, before the collection of matter has existed a good while; for, the situation of the abscess is so deep, that no fluctuation, nor swelling, becomes perceptible, until a considerable quantity of pus has accumulated. Besides, it would not be judicious to expose the patient to the hazard, which might arise from making an opening, into the abdomen, merely for the sake of giving vent to a small collection of matter.

Many, indeed almost all writers, impute a vast deal of the danger of wounds of the abdomen to the entrance of air into the cavity of the peritoneum, and they also adduce this as an argument against opening abscesses of the abdomen. In inculcating such opinions, however, they betray an inaccuracy of observation, which a very little reflection would have set right. Too much stress has long been laid on the introduction of air into the abdomen, as being a cause of inflammation. The fact is, that the cavity of the belly is always so completely occupied by the various viscera, that the whole inner surface of the peritoneum is constantly in close contact with them, and, consequently air cannot so easily diffuse itself from the vicinity of the wound, throughout the abdomen, as has been conceived. After tapping, in dropsical cases, we seldom see inflammation arise, though air has, in this instance, quite as good an opportunity of entering

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* P. 98. The case of a man, who was wounded across the belly, and well and abroad, in seven days.

the abdomen, as in any case of a wound. The peritoneum in animals has been inflated, without any inflammation being excited. In cases of tympanitis, the peritoneum is distended with air, and yet both this membrane and the bowels are quite uninflamed. In the human subject, it seems probable, that, if a wound were made in a vacuum, the breach of continuity itself would lead to inflammatory consequences. We have also to remark, that collections of matter in the abdomen are almost always completely circumscribed, and separated from the general cavity of the peritoneum, by the adhesion of the viscera to each other, and to the inside of the peritoneum.

I am of opinion, that no surgical writer has succeeded so well, as Mr. John Bell, in exposing the absurd apprehensions, not uncommonly entertained by practitioners, respecting the entrance of air into the abdomen and other cavities of the body. He enquires: 1st, Whether air can really get into the cavity of the abdomen? and 2dly, Whether, if it were there, it would produce the dreadful effects ascribed to it?

Upon the first question, his arguments run thus: "Suppose a wound of an inch in length:—suppose the bowel to have sunk, in some strange way, into the pelvis, for example, so as to have left a mere vacuum; what should happen with the flexible parietes of the abdomen? Should they stand rigid, while the air rushed into the cavity to fill it? No, surely. But, on the contrary, the walls of the abdomen would fall together, and the pressure of the outward air, far from making the air rush in by the outward wound, would, at once, lay the belly flat, and close the wound. But, since the walls of the abdomen are not flaccid, nor the cavity empty, but the abdomen full, and the flat muscles, which cover it, acting strongly, the effect must be much more particular; for, the moment that the belly is wounded, the action of the muscles will force out part of the bowels; the continuance of that action is necessary to respiration; the respiration continues as regular after the wound, as before; and the continual pressure of the abdominal muscles and the diaphragm, against all the viscera of the abdomen, prevents the access of air so effectually, that, though we should hold such a wound open with our fingers, no air could pass into the abdomen, further than to that piece of gut which is first touched with the finger, when we thrust it into the abdomen. Nothing is absolutely exposed to the air, except that piece of intestine, which is without the abdomen, or that, which we see, when we expose a small piece of the bowels, by holding aside the lips of the wound. The pressing forward of that piece, and the protrusion of a portion of the gut, proportioned always to the size of the wound; the pressure from behind keeping that piece protruded, so that it is with difficulty, we can push it back with our finger; this incessant pressure, in all directions, is an absolute security against the access of air. The intestine comes out, not like water out of a bottle, the place of which must be supplied by air entering into the bottle, in proportion as the water comes out; but, the gut is pushed down by the action of the muscular walls of the abdomen, and that action follows the intestine, and keeps it down, and prevents all access of the air whether the gut continue thus protruding, or whether it be reduced; for, if it be reduced, the walls of the abdomen yield, allowing it to be thrust back, but admitting no air. Those, who want to know the effect of air, diffused within the cavity of the abdomen, must make other experiments, than merely cutting open pig's bellies;—they must give us a fair case, without this unnecessary wound. We will not allow them to say, when they cut open the belly of any creature, with a long incision, that the inflammation arises from the air: much less shall we allow them to say, when they open the belly with a smaller incision, that, by that little incision, the air gets into the abdomen, and that all the bowels are exposed to the air." (*Discourse on the Nature and Cure of Wounds*, p. 333, 334.)

In adverting to the question, whether air is so irritating to the cavities of the body, as many have supposed, Mr. John Bell criticises, with much spirit and success, the opinions, published on this subject, by Dr. A. Monro, in his account of the Bursæ Mucosæ, as the annexed quotations will shew. "That the vulgar should believe, the first superficial impression that strikes them, of air hurting a wound or sore, is by no means surprising; but, it is not natural, that men, bred to philosophy, should allow so strange an assertion as this, without some kind of proof. That the air, which we breathe, and which we feel upon the surface so bland and delightful, should have so opposite a relation to the internal parts, that it should there be a stimulus, more acrid and more dangerous, than the urine, is not to be believed upon slight grounds. I do affirm, (says Mr. John Bell) that it remains to be proved, that this fluid, which seems so bland and pleasant to all our senses, and to the outward surface, is yet a horrible stimulus, when admitted, as a celebrated author grandly expresses it, "into the deep recesses of our body." (*Munro's Bursæ Mucosæ.*)

With how much reason, Mr. John Bell objects, that this doctrine is unfounded, will be manifest to every man of any discernment, or impartiality.

"The air, for instance, escapes from the lungs, in a fractured rib, and first goes abroad into the thorax; then into the cellular substance; then the emphysematous tumour appears; but, often, without any scarifications, with very little care and assistance on our part, the air is absorbed, the tumour disappears, and, without inflammation of the chest, or any particular danger, the man gets well. Here then is the air, within the cavity of a shut sac, filling the thorax, and oppressing the lungs, without any dangerous inflammation ensuing.

"That the air may be pushed under the cellular substance over all the body, without causing inflammation, is very plain from the more desperate cases of emphysema, where the patients, after living eight or ten days, have died, not from inflammation, but, from oppression merely, the body being so crammed with air, that even the eye-balls have, upon dissection, been found as tense as blown bladders. We have also many ludicrous cases of this kind, which prove this to our perfect satisfaction. Soldiers, and sailors, sometimes touch the scrotum with a lancet, introduce a blow-pipe, and blow it up to an enormous size, imitating herniæ, by which they hope to escape from the service. The old story of a man, who was so wicked as to make a hole in his child's head, and blow it up, that he might shew the child in the streets of Paris for a monster, is well authenticated; and, I have little doubt, that a fellow, who knew how to do this, would blow it up every morning, and squeeze it out when he put the child to bed at night. Some villainous butchers, having a grudge at a soldier, found him lying drunk, under a hedge; they made a little hole in his neck, and blew him up, till he was like a bladder, or, as Dr. Hunter describes the disease of emphysema, *like a stuffed skin.*" (*P.* 338, 339.)

After many other pertinent observations, blended with appropriate satyr, on the extravagant notions professed by Monro on the bad effects of the air, in lithotomy, operations for hernia, and hydrocele, the Cæsarean section, &c, Mr. John Bell most justly holds up to ridicule the propositions of Dr. Aitken *to perform this last operation under the cover of a warm bath in order to exclude the air.* "This, though it may seem to be a scurvy piece of wit, was really proposed in sober serious earnest. But (adds Mr. John Bell), the admission of atmospheric air, as a stimulus, when compared with the great incisions of lithotomy, of hernia, of hydrocele, of Cæsarean section, of the trepan, is no more, than the drop of the bucket to the waters of the ocean. And it is just as poor logic to say, that, after such desperate operations, these cavities are inflamed by the admission of air, as it would be to say, (as Monro did) that when a man is run through the pericardium with a red hot poker, that the heart and pericardium are inflamed by the admission of the air." (*P.* 347, *edit.* 3.)

Enough, I conceive, has been said, to dispel all the idle fear and prejudices which have prevailed concerning the bad effects of the air in wounds of the abdomen, as well as several other cases. When so justly eminent a man, as Dr. Alexander Monro, senior, was disturbed with such apprehensions, it is not wonderful, that many a poor ordinary member of the profession should have been terrified nearly out of his wits upon the subject; and for quieting this alarm, and exposing its absurdities, I really think Mr. John Bell deserving of particular praise.

In general, it is an excellent rule, in all cases of wounds of the abdomen, never to be officious about abscesses, which may take place, nor concerning such viscera, as we may suspect to be injured. It is quite time enough to interfere, when the urgency of the symptoms has confirmed our conjectures. A great deal of harm is frequently done, by handling and disturbing the wounded parts more than is necessary, and, it is well known, that wounds, which are at first attended with most alarming symptoms, frequently terminate in a favourable manner. Persons have been known to have swords passed completely through their bodies, without suffering afterwards any threatening symptom, or, indeed, any effects which would authorise one to conclude, that the viscera had been at all injured. We are aware, that severe inflammations may not end in suppuration, and we also know, that when pus has been formed, the fluid has been often absorbed again. Nothing then indicates the necessity for giving vent to purulent matter lodged in the abdomen, except the fluctuation and situation of the abscess be very distinct, and the quantity and pressure of the matter productive of inconveniences.

For making an opening, some writers recommend a trocar; others, a lancet. The matter must be very copious and distinct, to justify the sudden introduction of such an instrument as a trocar. In other cases, the surgeon should make a cautious puncture with a lancet.

PROTRUSION OF THE VISCERA.

Wounds, penetrating the abdomen, sometimes allow considerable portions of the bowels, or omentum, to protrude, and, though these viscera may not have received any injury, yet, their being displaced in this way is sometimes productive of fatal consequences.

The best mode of preventing such a ca-

tastrophe, is to return the viscera into the cavity of the abdomen, as speedily as possible. Almost all authors recommend fomenting the displaced parts, before attempting to reduce them; but, in giving this advice, they seem to forget, that, while time is lost in this preparation, the protruded bowels suffer much more harm from exposure, and other circumstances, than they can possibly receive good from any applications made to them. No kind of fomentation can be half so beneficial, as the natural warmth and moisture of the cavity of the abdomen. In order to facilitate the return of protruded piece of intestine, or omentum, the abdominal muscles should be relaxed by placing the patient in a suitable posture, and the large intestines be emptied with a glyster. In mentioning the last measure, it is not meant, that the surgeon should delay the attempt to reduce the part, until the glyster has operated. No, this means is only enumerated as one that may become serviceable, in case the surgeon cannot immediately accomplish the object in view.—The mesentery ought always to be reduced before the intestine; the intestine before the omentum; but, the last protruded portion of each of these parts ought to be the first one reduced.

It is only when the intestine and omentum are free from gangrene and mortification, that they are invariably to be returned into the cavity of the belly, without hesitation. Also, when the protruded parts are covered with sand, dust, or other extraneous matter, it is undoubtedly proper to make them as clean as possible, before putting them back into the abdomen. For this purpose, the parts should be tenderly washed with a little luke-warm milk and water.

The two index fingers are the most convenient for reducing the parts, and, it is a rule to keep the portion, first returned, from protruding again by one finger, until it has been followed by another portion, introduced by the other finger. The second piece is to be kept up, in the same way, by the finger used to return it; and so on, till the whole of the displaced parts have been put into their natural situation.

In attempting to reduce a piece of protruded intestine, the patient should be placed in the most favourable posture; the head and chest should be elevated, and the pelvis raised with pillows. Nothing can be more absurd, than the advice to have the thorax rather lower than the pelvis, in order that the weight of the viscera may tend to draw inward the protruded parts. This is another erroneous idea, arising from the ridiculous supposition, that a great part of the abdomen is actually an empty cavity. The relaxation of the abdominal muscles is a much more rational and useful object.—When this is properly attended to, and the wound is not exceedingly small, in relation to the bulk of the protruded viscera, the parts may generally be reduced by observing the above directions. But, in addition to what has been already stated, it is necessary to remark, that the pressure should be made in a straight direction into the abdomen; for, when made obliquely, towards the edges of the wound, the parts are liable to suffer contusion, without being reduced, and even to glide between the layers of the abdominal muscles, and become strangulated. When the wound is in the front of the abdomen, pressure made in this unskilful way, may easily make the viscera slip into the sheath of the rectus muscle, and cause the same perilous symptoms, as arise from an incarcerated hernia. (See *Hernia.*)

When the reduction seems complete, the surgeon should assure himself of it, by introducing his finger into the cavity of the abdomen, so as to feel, that the parts are all actually reduced, and suffer no constriction between the edges of the wound and the viscera in the abdomen.

A difficulty of reduction may arise from the protruded intestines being distended with feces, or air. In this circumstance, the contents of the gut may frequently be made to pass, by little and little, into that portion of the intestinal canal, which is within the abdomen. To accomplish this purpose, the surgeon must press the contents of the bowel towards the wound, and, if he succeeds in emptying the part, he will commonly experience equal success in his next attempt to replace it in the abdomen.

Sometimes, considerable pieces of intestine are found protruded, through narrow wounds of the abdomen, and the reduction cannot be effected, without doing more violence to the bowel, than its delicate structure would bear. In this case, dilating the wound becomes indispensable. However, very frequently, when the reduction seems almost a matter of impossibility, on account of the smallness of the wound, relaxing the abdominal muscles, drawing a little more intestine out of the wound, and gently pressing the contents of the bowel, through the constriction into the abdomen, will render the protruded part sufficiently reducible, without any operation to enlarge the wound.

When such operation is unavoidable, the dilatation should be made in a direction, which will not endanger the epigastric artery, and if possible, in the same line as the muscular fibres. It would be unpardonable to make a more extensive incision than absolutely requisite, as herniæ are very much disposed to occur, wherever the

peritoneum has been divided. The operation may be done with a curved bistoury and a director, much in the same way as is done in cases of strangulated ruptures. (See *Hernia.*)

Instead of enlarging wounds of the abdomen, it has been proposed to let out the air from the intestines, by making small punctures with the point of a needle, and thus lessen the volume of the protruded part sufficiently to render it easily reducible. This suggestion first originated with Ambroise Paré, who declares, that he has several times practised the method with success. Rousset, his cotemporary, also informs us, that the plan was adopted by another surgeon, in an instance, where the epigastric region was wounded, and a large portion of the intestines was protruded and strangulated. Peter Lowe, an English surgeon, likewise assures us, that he has frequently pursued such practice, when other means failed. Garengeot, Sharp, and Van Swieten, are all advocates for Paré's proposal; but they recommend employing a round needle, which will merely separate the intestinal canal, without cutting them, as a flat, triangular, sharpedged needle would unavoidably do. These last celebrated writers, however, only sanction the practice, when the quantity of protruded intestine is exceedingly great, and when it is so enormously distended with air, that it would be impossible to reduce the part, though the wound were enlarged, and every thing else, likely to promote the reduction, were put in practice. But, as the judicious Sabatier has remarked, the punctures must be entirely useless, if made with a fine needle, since they will be immediately stopped up with the mucous secretion, with which the inside of the bowels is constantly covered; and if the punctures are made with a broad triangular needle, or a very large round one, as Desault and Chopart have advised, they must be highly dangerous, inasmuch as they must be extremely likely to give rise to inflammation, and even to extravasation within the abdomen. (See *Médécine Opératoire*, *Tom.* i, *p.* 10.)

It was the circumstance of small punctures being unavailing, that led Desault and Chopart to recommend the use of a large round needle, "*pour que l'ouverture ne soit point bouchée par les mucosités dont les intestines sont enduits.*" But, they were also aware of the danger of employing such an instrument, since they give us directions how to proceed, in order to prevent extravasation and inflammation: "*On prévendra l'epanchement des matieres stercorales en passant, avant de reduire l'intestin, une anse de fil dans la portion de mesentère qui répond à la piqure pour la fixer contre les bords de la plaie extérieure, et l'on combattra par les remèdes généraux l'inflammation que cet piqure peut attirer.*" (*Traité des Maladies Chirurg. Tom.* 2, *p.* 135.)

Mr. Travers, one of the latest writers upon this subject, most properly joins in the condemnation of the plan of pricking the protruded bowels. "Blancard and others protested against this practice, on the very sufficient ground of its inefficacy. La Faye very truly says, it is a useless as well as dangerous practice; for the openings, made by a round needle, cannot give issue to the contained air." Mr. Travers then cites two cases, shewing that even small stabs in a bowel will not prevent its becoming distended with air. "A man was brought to St. Thomas's hospital, on Saturday, the 30th of June last (1811), who had been stabbed in the direction of the epigastric artery, on the left side of the abdomen, by a case knife. He died in eighteen hours, apparently from the sudden and copious hemorrhage, which had taken place within the belly. About half a yard of ileon was protruded. The gut was highly discoloured, and so much distended, notwithstanding it was pierced in three places, that the wound of the integuments required to be freely dilated, before it could be returned. *The apertures were in fact obliterated by the mucous coat.*"

"It appeared upon the trial of Captain Sutheriand (Ann. Reg. June 1809) for the murder of his cabin boy, that the intestines had been extensively protruded through a wound near the left groin, and had lain exposed for four or five hours—that the dirk had pierced through one fold of intestine, and entered another—that the wound of the intestine was *half an inch* long, that the reduction could not be accomplished until the parietal wound was dilated; and that the intestine was then returned, and the integuments sewed up." (*Travers on Injuries of the Intestines*, *p.* 174, 176).

I must observe, however, with respect to this last case, that it does not satisfactorily prove what the author intends it to shew, namely, *that the bowel was distended with air, though there was a wound in it half an inch long*, for, the evidence does not inform us, that the difficulty of reduction was owing to this cause. I have seen a very small portion of omentum protruded through a wound, and baffle all endeavours to reduce it for nearly an hour. The first case, adduced by Mr. Travers, however, is more explicit and interesting; and we are to infer from it, and the observations of Haller, that the punctures, made in an intestine, are not closed by mucus, as Sabatier and Desault have asserted, but by the mucous coat itself.

As the above expedient had been recommended by writers of some weight, I thought that the subject should not be

passed over in silence, and without a caution to the reader, never to put any confidence in the method. The plan does not facilitate the business of the operator; there is not even this solitary reason in favour of the practice; and though it may have answered when large needles were used, and some patients, so treated, may have recovered; yet, every person, who has the least knowledge of the animal economy, will easily comprehend, how even the smallest opening, made in parts, so irritable and prone to inflammation, as the bowels, must be attended with greater danger than would result from enlarging a wound of the skin and muscles. Besides the air may frequently be pressed out of the intestine in a safer way, as I have already described.

A wound of the abdomen, attended with one of the most considerable protrusions of the viscera, that I have ever read of, is recorded by Mr. Hague, surgeon at Ripon: "August 30th 1808 (says this gentleman) I went to Norton Mills, about four miles from hence, to see John Brown æt. 12 years, who had received a wound in the abdomen by a wool shears. On my arrival, which was little more than an hour after the accident, I found the poor lad in a very distressing situation; the *great arch of* the stomach, and the *whole of the intestinal canal*, (duodenum excepted) contained within the abdomen, having protruded through the wound. The incision was on the left side of the body, commencing at about two inches below the scrobiculus cordis, and extending in a straight line near four inches in length, distant from the navel two inches, and he was quite sensible, and had vomited so as to empty the stomach; very little blood was lost. I immediately proceeded very carefully to examine the protruded viscera, none of which were wounded, and reduced them as quickly as possible, beginning with the stomach, and following the regular course of the intestines, in the latter portion of which, I distinctly felt feces, of rather firm consistence. He complained of some pain, during the reduction, though not much, and expressed great relief, when the parts were completely returned. I now desired an assistant, to lay the palm of his hand over the wound, and make some pressure upon it; for, I found, that, without this, the parts would soon have protruded again by the action of respiration, which was oppressed and laborious. I brought the sides of the wound together by five sutures, beginning from above downwards, and passed the needle on each side, quite through the integuments with the peritoneum, &c. The wound was also dressed with adhesive plaster, and covered with a bandage." Vide *Edinburgh Medical and Surgical Journal, Vol. 5, p.* 129, &c.

This case is really an interesting one; for, notwithstanding so unlimited a protrusion of the viscera, and the parts had been left unreduced for more than an hour, a recovery ensued, under the judicious employment of bleeding, purging, anodynes, &c.

When the protruded intestine is wounded, the opening is to be closed with a particular suture, before the part is returned into the abdomen. Of this subject, when we speak of the wounds of the intestines.

Some of the exposed intestine may have mortified, before the arrival of surgical assistance. This event is exceedingly rare in cases of wounds, but, is not uncommon in those of strangulated herniæ. The treatment will be explained in the article *Hernia*.

When the protruded intestine is in a state of inflammation, its immediate reduction is, beyond all dispute, the means most likely to set every thing right. Even when the inflammation has risen to a vehement pitch, a timely reduction of the displaced part, and the employment of antiphlogistic means will often prevent gangrenous mischief. The dull, brown, dark red colour of the intestine may induce the practitioner to suppose, either that the part is already mortified, or must inevitably become so, and, consequently, he may delay returning it into its natural situation. But, notwithstanding this suspicious colour of the intestine, its firmness will evince, that it is not in a state of gangrene. The ultimate recovery of a portion of intestine, so circumstanced, is always a matter of uncertainty; but, the propriety of speedily replacing the part in its natural situation is a thing most certain. In case the bowel should mortify after being reduced, all hopes of the preservation of life are not to be abandoned; as we shall notice again in the subject of hernia, where every thing necessary to be known, concerning the mode of reducing protruded omentum, will also be found.

The protruded viscera having been reduced, the next object is to retain them in the abdomen, until the wound is completely healed. When the wound is small, this is a matter of no difficulty; in this instance, it is enough to put the patient in such a position, as shall relax the fibres of the wounded muscles, while the edges of the wound are maintained in contact with sticking plaster, and supported, in this way, by a compress and bandage. Costiveness is to be removed by the mildest purgatives, such as the soda phosphorata and oleum ricini, or by laxative glysters, which are still preferable. But, in cases of extensive wounds, even when the treatment is conducted with all possi-

ble judgment, it is occasionally very difficult, and impossible, to hinder the protrusion of the bowels by common dressings, and a bandage. In this circumstance the edges of the wound must be sewed together by a particular suture, named *Gastroraphe*. (See this article). It is proper to remark, however, that, in modern times, this suture is very rarely employed, in comparison with what it was formerly, and, in the description of gastroraphe, some remarks will be offered, for the purpose of proving, that even the generality of large wounds of the abdomen do not require any suture whatsoever.

EXTRAVASATION IN THE ABDOMEN.

Wounds of the abdomen may be complicated with extravasations of blood, chyle, excrement, bile, or urine. None of these complications, however, are half so frequent, as an unreflecting and inexperienced practitioner might apprehend. The employment of the phrase *cavity of the abdomen* has paved the way to much erroneous supposition upon this subject, and has induced many absurd notions, which even the sensible observations, long ago published by Petit (le fils), have scarcely yet dispelled.

As a modern writer has observed: "there is not truly any cavity in the human body, but, all the hollow bowels are filled with their contents, all the cavities filled with their hollow bowels, and the whole is equally and fairly pressed. Thus, in the abdomen, all the viscera are moved by the diaphragm and the abdominal muscles upwards and downwards, with an equable continual pressure, which has no interval; and one would be apt to add, the intestines have no repose, being kept thus in continual motion; but, though the action of the diaphragm, and the reaction of the abdominal muscles are alternate, the pressure is continual; the motion, which it produces, (they produce) is like that which the bowels have, when we move forwards in walking, having a motion, with respect to space, but none with regard to each other, or to the part of the belly, which covers them; the whole mass of the bowels is alternately pressed, to use a coarse illustration, as if betwixt two broad boards, which keep each turn of intestine in its right place, while the whole mass is regularly moved. When the bowels are forced down by the diaphragm, the abdominal muscles recede: when the bowels are pushed back again, it is the reaction of the abdominal muscles, that forces them back and follows them; there is never an instant of interruption of this pressure, never a moment, in which the bowels do not press against the peritoneum; nor is there the smallest reason to doubt, that the same points in each are continually opposed. We see, that the intestines do not move, or, at least, do not need to move in performing their functions; for, in hernia, where large turns of intestines are cut off by gangrene, the remaining part of the same intestines is closely fixed to the groin, and yet the bowels are easy, and their functions regular. We find the bowels regular, when they lie out of the belly, in hernia, as when a certain turn of intestine lies in the scrotum, or thigh, or, in a hernia of the navel; and where yet they are so absolutely fixed, that the piece of intestine is marked by the straitness of the rings. We find a person, after a wound of the intestine, having free stools for many days; and what is it, that prevents the feces from escaping, but merely this regular and universal pressure? We find a person, on the fourth or fifth day, with feces coming from the wound! a proof, surely, that the wound of the intestine is still opposite, or nearly opposite, to the external wound. We find the same patient recovering without one bad sign! What better proof than this could we desire, that none of the feces have exuded into the abdomen?

"If, in a wound of the stomach, the food could get easily out by that wound, the stomach would unload itself that way, there would be no vomiting, the patient must die; but, so regular and continual is this pressure, that the instant a man is wounded in the stomach, he vomits, he continues vomiting for many days, while not one particle escapes into the cavity of the abdomen. The outward wound is commonly opposite to that of the stomach, and, by that passage, some part of the food comes out; but, when any accident removes the inward wound of the stomach from the outward wound, the abdominal muscles press upon the stomach, and follow it so closely, that if there be not a mere laceration extremely wide, this pressure closes the hole, keeps the food in, enables the patient to vomit, and not a particle, even of jellies, or soups, is ever lost, or goes out into the cavity of the belly.

"How (proceeds Mr. J. Bell) without this universal and continual pressure, could the viscera be supported? Could its ligaments, as we call them, support the weight of the liver? Or, what could support the weight of the stomach when filled? Could the mesentery, or omentum, support the intestines; or could its own ligaments, as we still name them, support the womb? How, without this uniform pressure, could these viscera fail to give way and burst? How could the circulation of the abdomen go on? How could the liver and spleen, so turgid as they are with blood, fail to burst? Or what possibly could support the loose veins and arteries of the abdomen,

since many of them, e.g. the splenic vein, is, (are) two feet in length, is (are) of the diameter of the thumb, and has (have) no other, than the common pellucid and delicate coats of the veins? How could the viscera of the abdomen bear shocks and falls, if not supported by the universal pressure of surrounding parts? In short, the accident of hernia being forced out by any blow upon the belly, or by any sudden strain, explains to us how perfectly full the abdomen is, and how ill it is able to bear any pressure, even from its own muscles, without some point yielding, and some one of its bowels being thrown out. And the sickness and faintness, which immediately follow the drawing off of the waters of a dropsy, explain to us, what are the consequences of such pressure being even for a moment relaxed. But, perhaps, one of the strongest proofs is this, that the principle must be acknowledged, in order to explain what happens daily in wounds; for, though in theory we should be inclined to make this distinction, that the hernia, or abscess of the intestines, will adhere and be safe, but, that wounded intestines, not having time to adhere, will become flaccid, as we see them do in dissections, and so, falling away from the external wound, will pour out their feces into the abdomen, and prove fatal; though we should settle this, as a fair and good distinction in theory, we find, that it will never answer in practice. Soldiers recover daily from the most desperate wounds; and the most likely reasons, that we can assign for it, are, the fulness of the abdomen, the universal, equable, and gentle pressure; and the active disposition of the peritoneum, ready to inflame with the slightest touch. The wounded intestine is, by the universal pressure, kept close to the external wound, and the peritoneum and the intestine, are equally inclined to adhere. In a few hours, that adhesion is begun, which is to save the patient's life, and the lips of the wounded intestine are glued to the lips of the external wound. Thus, is the side of the intestine united to the inner surface of the abdomen; and, though the gut casts out its feces, while the wound is open; though it often casts them out more freely, while the first inflammation lasts; yet, the feces resume their regular course, whenever the wound is disposed to close." (*John Bell's Discourses on Wounds*, *p.* 323, 327, *edit.* 3.)

The foregoing extract, though drawn up in a most careless style, contains such observations, as are well calculated to make the reader understand, that the abdomen is in reality not a cavity, but a compact mass of containing and contained parts; that the close manner, in which the various surfaces are constantly in contact, must powerfully oppose extravasations; and that, in fact, it often entirely prevents them. The passage cited impresses us with the utility of that quick propensity to the adhesive inflammation, which prevails throughout every peritoneal surface, and which not only often has the effect of permanently hindering effusion of the contents of the viscera, by agglutinating the parts together, but which, even when an extravasation has happened, beneficially confines the effused fluid in one mass, and surrounds it with such adhesions of the parts to each other, as are rapid in their formation, and effectual for the purposes of limiting the extent of the effusion, and preventing the irritation of the extravasated matter from affecting the rest of the abdomen.

It is to M. Petit, that we are indebted for the introduction of more correct modes of thinking upon the foregoing subject, and, as his valuable observations in the Mem. de l'Acad. de Chirurgie, are highly interesting, it is my intention to introduce them into this Dictionary, in the article, *Extravasation*, to which, for the present, I shall be content with referring.

But, notwithstanding the influence of the reciprocal pressure of the containing and contained parts against each other, and the useful effect of the quickly arising adhesive inflammation, in all penetrating wounds of the belly, complicated with the injuries of the viscera, we are not to suppose, that extravasation never happens; but, only that it is much less frequent than has been commonly supposed. Mr. Travers, with much laudable industry, has endeavoured to trace more minutely, than any preceding writer, the particular circumstances, under which effusions in the abdomen are likely or unlikely to happen. "It being admitted (says he) that there are cases, in which effusion does take place, it is easy to conceive circumstances, which must considerably influence this event. If, for example, the stomach and bowels be in a state of emptiness, the nausea, which follows the injury, will maintain that state. If the extent of the wound be considerable, the matter will more readily pass through the wound, than along the canal. A wound of the same dimensions in the small and the large intestines, will more readily evacuate the former, than the latter, because it bears a larger proportion to the calibre. Incised and punctured wounds admit of the adhesion of the cut edges, or the eversion of the internal coat of the gut, so as to be in many instances actually obliterated; whereas, lacerated, or ulcerated opening, do not admit of these salutary processes. Again, in a transverse section of the bowel, contraction of the circular fibre closes the wound, whereas in a longitudinal section, the contraction of this fibre

enlarges it. Such (says Mr. Travers) are the circumstances, which combined, in a greater or less degree, increase or diminish the tendency to effusion." (*On Injuries of Intestines, &c. p.* 13—14.)

After the details of some experiments and cases, the preceding author makes among other conclusions, the following:

1. That effusion is not an ordinary consequence of penetrating wounds.

2. That, if the gut be full and the wound extensive, the surrounding pressure is overcome, by the natural action of the bowel tending to the expulsion of its contents.

3. That, if food has not recently been taken, and the wound amounts to a division of the gut, or nearly so, the eversion and contraction of the orifice of the tube, prevent effusion.

4. That, if the canal be empty at the time of the wound, no subsequent state of the bowel will cause effusion, because the supervening inflammation agglutinates the surrounding surfaces, and forms a circumscribed sac; nor can effusion take place from a bowel at the moment full, provided it retains a certain portion of its cylinder entire, the wound not amounting nearly to a semidivision of the tube, for then the eversion and contraction are too partial to prevent an extravasation.

5. That, when however air has escaped from the bowel, or blood has been extravasated in quantity within the abdomen at the time of the injury, the resistance, opposed to effusion, will be less effectual, although the parietal pressure is the same, as such fluids will yield more readily, than the solids naturally in contact. *P.* 25—26, 100.

6. That, though extravasation is not common in penetrating wounds, it follows more generally in cases, where the bowel is ruptured by blows, or falls upon the belly, while the integuments continued unwounded. *P.* 36.

7. That when the bowels are perforated by ulceration, there is more tendency to effusion, than in cases of wounds. *P.* 38, &c.

Mr. Travers attempts to explain the reason of the greater tendency to effusion, in cases of intestine burst by violence, and in those of ulceration "by the difference in the nature of the injury, which the bowel sustains, when perforated by a sword or bullet, as in the one case, or burst or ulcerated in the other. A rupture by concussion could only take place under a distended state of the bowel, a condition most favourable to effusion, and from the texture of the part, a rupture, so produced would seldom be of limited extent. The process of ulceration, by which an aperture is formed, commences in the *internal* coat of the bowel, which has always incurred a more extensive lesion, than the peritoneal covering. The puncture, or cut, is merely a solution of continuity in a point, or line; the ulcerated wound is an actual loss of substance. The consequence of this difference is, that, while the former, if small, is glued up by the effusion from the cut vessels, or, if large, is nearly obliterated, by the full eversion of the villous coat, the latter is a permanent orifice." *P.* 46.

How much Mr. Travers and Mr. John Bell differ in opinion, upon these latter points, will appear from the following passage: after adverting to the adhesion, which takes place between the viscera and the peritoneum, under a variety of circumstances attending disease, Mr. John Bell observes: "this it is, which makes the chief difference, in point of danger, betwixt an ulcerated and a wounded intestine; for, in a wound, there is, as we should suppose, no time for adhesion, nothing to keep the parts in contact, no cause, by which the adhesion might be produced. But, in an ulcer, there is a slow disease, tedious inflammation, adhesion first, and abscess, and bursting afterwards; sometimes a fistula remains discharging feces, and sometimes there is a perfect cure. If a nutshell, a large coin, a bone, or any dangerous thing be swallowed, it stops in the stomach, causing swelling and dreadful pain; at last, a hard, firm tumour appears, and then it suppurates, bursts, the bowel opens, the food is discharged at every meal, till the fistula gradually lessens, and heals at last. But, where the stomach is cut with a broad wound of a sabre, the blood from the wounded epiploic vessels, or the food itself, too often pours out into the abdomen, and the patient dies." &c. (*Discourses on Wounds, p.* 321, *edit.* 3.) The author afterwards proceeds to explain, how the compact state of the containing and contained parts, and the incesssant and equable pressure, which the viscera sustain, frequently hinders effusion in cases of penetrating wounds.

Which of these gentlemen is most correct on the subject, I cannot pretend to say. Mr. Travers has certainly adduced a few cases, in favour of his own statement. Whether they are deviations from what is most common, can only be decided by a comparative examination of a greater number of facts. When the intestines ulcerate, and thus rid themselves of foreign bodies, the general tenor of the cases on record undoubtedly affords us little reason to be apprehensive of extravasation. Yet, with respect to ulceration of the intestines from other causes, circumstances may be very different.

Blood is more frequently extravasated

in the abdomen, than any other fluid. Extravasations of this kind, however, do not invariably happen, whenever vessels of not a very considerable size are wounded. The compact state of the abdominal viscera, in regard to each other, and their action on each other, oppose this effect. The action, alluded to, which depends on the abdominal muscles and diaphragm, is rendered very manifest by what happens, in consequence of operations for herniæ attended with alteration of the intestines, or omentum. If these viscera should burst, or suppurate, after being reduced, the matter which escapes from them, or the pus, which they secrete, is not lost in the abdomen; but is propelled towards the wound of the skin, and there makes its exit. The intestinal matter, effused from a mortified bowel, has been known to remain lodged the whole interval, between one time of dressing the wound and another, in consequence of the surgeon stopping up the external wound with a large tent. When the abovementioned action or pressure of the muscles, is not sufficient to keep the blood from making its escape from the vessels, still it may hinder it from becoming diffused among the convolutions of the viscera, and thus the extravasation is confined in one mass. The blood, effused and accumulated in this way, is commonly lodged at the inferior and anterior part of the abdomen, above the lateral part of the pubes, and by the side of one of the recti muscles. The weight of the blood may propel it into this situation, or, perhaps, there may be less resistance in this direction, than in another. In opening the bodies of persons, who have died with such extravasations, things may put on a different aspect, and the blood seem to be promiscuously extravasated over every part of the abdomen. But, when such bodies are examined with care, it will be found, that the blood does not insinuate itself among the viscera, till the moment when the abdomen is opened, and the mass previously lies in a kind of pouch. This pouch is frequently circumscribed, and bounded by thick membranes, especially when the extravasation has been of some standing. (*Sabatier Médecine Opératoire, Tom.* 1, *p.* 28—30.)

It is of the highest consequence to a practical surgeon to remember well, that all the parts contained in the abdomen are closely in contact with each other, and with the inner surface of the peritoneum. This is one grand reason, why extravasations are seldom so extensively diffused as one might imagine; but, commonly lie in one mass, as Petit, Sabatier and all the best moderns have noticed. The pressure of the elastic bowels, of the diaphragm, and abdominal muscles, not only frequently presents an obstacle to the diffusion of extravasated matter, but often serves to propel it towards the mouth of the wound. The records of surgery make mention of numerous instances, in which persons have been stabbed through the body, without any fatal consequences, and sometimes without the symptoms being even severe. In Mr. Travers's publication many cases, exemplifying this observation, are quoted from a variety of sources; Fab. Hildan Obs. Chirurg. Cent. 5. Obs. 74. Œuvres de Paré, liv. 10. Chap. 35. Wiseman's Surgery, p. 371. La Motte's Traité Complet de Chirurgie; &c. &c. In such cases the bowels have been supposed to have eluded the point of the weapon, and this may perhaps in a few instances have been actually the fact; but, in almost all such examples, there can be no doubt, that the bowels have been punctured, and an extravasation of intestinal matter has been prevented by the opposite pressure of the adjacent viscera. Such resistance and pressure may, also, have occasionally obliged intestinal matter, or blood, actually extravasated, to pass through the wound of the bowel into its cavity, and thus be speedily removed. Certain it is, such copious evacuations of blood *per annum* have followed stabs of the abdomen, as could hardly proceed from the arteries of the intestines. This way of getting rid of an extravasation must be rare, however, compared with that by absorption.

The pouch, or cyst, including extravasated blood, or matter, as mentioned by Sabatier, is formed by the same process, which circumscribes the matter of abscesses. (See *Suppuration.*) It is in short the adhesive inflammation. All the surfaces in contact with each other, and surrounding the extravasation, and track of the wound, generally soon become so intimately connected together by the adhesive inflammation, that the place in which the extravasation is lodged, is a cavity entirely destitute of all communication with the cavity of the peritoneum. The track of the wound leads to the seat of the effused fluid, but, has no distinct opening into the general cavity of the abdomen. The rapidity with which the above adhesions form, is often very great, almost incredible.

It should be known, however, that extravasations are occasionally diffused in various degrees among the viscera, owing to the patient being subjected to a great deal of motion, or his having violent spasmodic contractions of the intestines, arising from the irritation of the extravasated matter. Urine and bile are more frequently dispersed to a great extent among the abdominal viscera, than blood. The latter fluid, indeed, must often coagulate; a circumstance, that must both tend to stop further hemorrhage, and confine the extravasation in one mass.

SYMPTOMS AND TREATMENT OF EXTRAVASATIONS IN THE ABDOMEN.

1. *Blood.*

Wounds of the spleen, and of such veins and arteries, as are above a certain size, almost always prove fatal from internal hemorrhage. The blood generally makes its way downwards, and accumulates at the inferior part of the abdomen, unless the existence of adhesions happen to oppose the descent of the fluid to the most depending situation. The belly swells, and the fluctuation of a fluid is perceptible through the anterior part of the abdominal parietes. The patient grows pale, loses his strength, is affected with syncope, and his pulse becomes weaker and weaker. In short, the symptoms, annually attendant on hemorrhage, are observable. The viscera and vessels in the abdomen being continually compressed on all sides, by the surrounding parts, the blood cannot be effused, without overcoming a certain degree of resistance; and unless a vessel of the first magnitude, like the aorta, the vena cava, or one of their principal branches, has been wounded, the blood escapes from the vessel slowly, and several days elapse, before any considerable quantity has accumulated in the lesser cavity of the pelvis.

In these cases of extravasated blood, the symptoms which, perhaps, had disappeared, under the employment of bleeding and anodyne medicines, now come on again. A soft, fluctuating tumour may be felt at the lower part of the abdomen; sometimes on the right side; sometimes on the left; occasionally, on both sides. The pressure, made by the effused blood on the urinary bladder, excites distressing inclinations to make water; while the pressure, which the sigmoid flexure of the colon suffers, is the cause of obstinate constipation. In the mean time, the quantity of extravasated blood increasing, irritation and inflammation of the peritoneum are induced. The pulse grows weaker; debility ensues; the countenance is moistened with cold perspirations; and, unless instigated by all the antecedent circumstances, the surgeon practises an incision for the discharge of the fluid, the patient falls a victim to the accident.

In the year 1733, Vacher, principal surgeon of the military hospital at Besancon, successfully adopted this mode of treatment, as I shall more particularly notice in the article *Extravasation*. Petit (the son) afterwards tried the same plan, though it did not answer, (as is alleged) in consequence of the inflammation having advanced too far, before the operation was performed. Long before the time of Vacher and Petit, a successful instance of similar practice had been recorded by Cabrole, in a work, which this author published, under the title of Αλφαβητον ανατομικον, id est, Anatomes elenchus accuratissimus, omnes humani corporis partes eâ quâ solent secari methodo, delineans. Accessere osteologia, observationes que Medicis ac Chirurgis perutiles. Genevæ 1604. Hence, as Sabatier has remarked, the method pursued by Vacher, was not so new as Petit imagined. (*Médecine Opératoire, Tom.* 1, *p.* 32.)

Indeed, when the symptoms leave no doubt of there being a large quantity of blood extravasated in the abdomen; when the patient's complaints are of a very serious nature, and are evidently owing to the irritation and pressure of the blood on the surrounding viscera; and when a local swelling denotes the seat of the extravasation, there cannot be two opinions about the propriety of making an incision for its evacuation.

Surgeons, however, should recollect, that a small extravasation of blood may exist, without producing any very considerable irritation, provided no opening be made into the cyst, with which it becomes surrounded. On the contrary, when such cyst is opened, the air then having free access to the blood contained there, that part of the fluid, which cannot be discharged, is very apt to putrify, and become so irritating, as to excite inflammation of the surrounding parts.—Even though there may be an evident extravasation of blood, the bad symptoms are also sometimes entirely owing to the injury done to the parts within the abdomen, and neither to the pressure, nor the irritation of the effused blood.

But, sometimes as we have already noticed, the accumulated blood at first, neither irritates the adjacent parts by its quantity nor quality. An inflammation, however, of the parts surrounding the extravasation at length takes place. The tension, irritation, and pain, which, in the first instance arose from the wound itself, and subsided, seem now to be renewed. When the extravasation is at the lower and anterior part of the abdomen, the patient experiences pain about the hypogastric region. He is also constipated, and, as he suffers great irritation of the bladder, he feels frequent propensities to make water, but cannot relieve himself. At last, a tumour makes its appearance, attended with a fluctuation more or less distinct.

In this instance, it seems proper to give vent to the accumulated blood. If this fluid should be found coagulated, injections of warm water would facilitate its discharge. (*Sabatier Médecine Opératoire, Tom.* 1.)

2. *Chyle and Fæces.*

These are not so easily extravasated in the abdomen as blood, because they do not require so much resistance, on the outside of the stomach and intestines, to make them

continue their natural rout through the alimentary canal, as blood requires to keep it in the vessels. Extravasations of this kind, however, sometimes happen, when the wound is large and the bowel distended at the moment of the injury, or when, as Mr. Travers has likewise explained, air is extravasated, or blood effused in the abdomen; these fluids being incapable of making effectual resistance to the escape of the intestinal matter. (See *an Enquiry into the Process of Nature in repairing Injuries of the Intestines*, &c. *p.* 26.) Nothing is a better proof of the difficulty with which chyle and feces are extravasated, than the operation of an emetic, when the stomach is wounded and full of aliment. In this instance, if the resistance to the extravasation of the contents of the stomach were not considerable, they would be effused in the abdomen, instead of being vomited up. A peculiarity in wounds of the stomach and intestines is, that the opening, which allows their contents to escape, may also allow them to return into the wounded viscus.

Extravasation of intestinal matter in the abdomen is attended with a severe train of febrile symptoms; dryness of the mouth, tongue, and fauces; considerable pain and swelling of the belly; convulsive startings; and hiccough and vomiting, with which the patients are generally attacked on the day after that, on which the wound was received. (*Sabatier de la Médecine Operatoire*, *Tom.* 1, *p.* 34.)

In these cases, general means are the only ones which can be employed; venesection, fomentations, low diet, perfect rest, anodynes, &c. All solid food must be most strictly prohibited. The close state of the viscera may also be increased by applying a bandage round the body.

If the symptoms are not speedily assuaged, the abdominal viscera become affected with general inflammation, and gangrene, and the patients die in the course of a few days.

3. *Bile.*

Bile, on account of its great fluidity, is more easily extravasated extensively in the abdomen, than either blood, or the contents of the stomach and intestines. Besides, the gall bladder has the power of contracting itself so completely, as to expel the whole of its contents. Notwithstanding these circumstances, however, extravasations of this kind are exceedingly uncommon, doubtless, on account of the small size of the gall bladder, and its deep guarded situation, between the concave surface of the liver, and upper part of the transverse arch of the colon.

Sabatier informs us, that he has only been able to find one example on record. This case, after having been communicated to the Royal Society of London, by Dr. Steward (No. 414, pag. 341. Abridgm. Tom. 7, pag. 571—572), was inserted, as an extract, in the third volume of the Edinburgh Essays, and also in the third volume of Van Swieten's Commentaries on the Aphorisms of Boerhaave, (transl. p. 65, edit. 1754). An officer received a wound, penetrating the cavity of the abdomen, and entering the fundus of the gall bladder, without doing any material injury to the adjacent parts. The abdomen was immediately distended, as if the patient had been afflicted with an ascites, or tympanitis; nor, did the swelling either increase, or diminish till the patient's death, which happened a week after the infliction of the wound.

There was no rumbling noise in the abdomen, though it was exceedingly tense. There were no stools, and very little urine was discharged, notwithstanding purgatives, and glysters, and a good deal of liquid nourishment, were given. The patient never had one instant of sound sleep, but, was always restless, though anodynes were exhibited. There was no appearance of fever, and the pulse was always natural till the last day of the patient's life, when it became intermittent. The intestines were found after death, very much distended, the gall bladder quite empty, and a large quantity of bile extravasated in the abdomen.

Sabatier met with an opportunity of observing the symptoms of an extravasation of bile, in consequence of a wound of the gall bladder. The patient's abdomen swelled very quickly; his respiration became difficult, and he soon afterwards complained of tension, and pain in the right hypochondrium. His pulse was small, frequent, and contracted; his extremities were cold, and his countenance very pale. The bleedings, which were practised the first day, gave him a little relief; but, the tension of the abdomen, and the difficulty of breathing, still continued. A third bleeding threw the patient into the lowest state of weakness, and he vomited up a greenish matter. On the third day, the lower part of the belly was observed to be more prominent, and there was no doubt of an extravasation. M. Sabatier introduced a trocar, and gave vent to a green blackish fluid, which had no smell, and was pure bile, that had escaped from the wound of the gall bladder. After the operation, the patient grew weaker and weaker, and died in a few hours. On opening the body, a large quantity of yellow bile was found between the peritoneum and intestines; but, it had not insinuated itself among the convolutions of the viscera. A thick gluten connected the bowels together, and they were prodigiously distended. The gall bladder was shrivelled and almost empty. Towards its fundus, there was a

wound, about a line and a half long, corresponding to a similar wound in the peritoneum. The wound, which had occurred at the middle and lower part of the right hypochondrium, between the third and fourth false ribs, had glided from behind forward, and from above downward, between the cartilages of the ribs, until it reached the fundus of the gall bladder.

Sabatier takes notice, that the symptoms of the two cases, which have just now been related, were very similar. Both the patients were affected with an exceedingly tense swelling of the belly unattended with pain, or borborygmus, and they were both obstinately constipated. Their pulse was extremely weak the latter days of their indisposition, and they were afflicted with hiccough, nausea, and vomiting. We must not positively infer, however, that such exactly would be the symptoms in every instance of a wound of the gall bladder, unaccompanied by injury of other viscera: this conclusion only admits of confirmation by attention to more numerous facts.

M. Sabatier seems to think one thing certain, viz. that wounds of the gall bladder attended with effusion of bile, are absolutely mortal, and that no operation can be of any avail. (*Médecine Opératoire, Tom.* 1, *p.* 34—37.

4. *Urine.*

Urine being of a very fluid nature may, like the bile, be easily extravasated in the abdomen, when the bladder is wounded at any part, which is connected with the peritoneum. If the urine, in this kind of case, be not drawn off with a catheter, so as to prevent this fluid issuing by the wound of the bladder, the patient soon perishes. There are many instances recorded of the bladder being injured even by gun shot wounds, which were not mortal. Such wounds, however, might only have injured the sides, or lower part of the bladder. But, in operating for the stone, above the pubes, the bladder has undoubtedly been occasionally cut at the part of the fundus, which is covered with the peritoneum. However, as the accident was known in the first instance, the right treatment was adopted, and such patients have recovered. (*Sabatier, Médecine Opératoire, Tom.* 1, *p.* 37.)

WOUNDS OF THE INTESTINES.

The vomiting of blood, or discharge of it by stool, the escape of fetid air, or of intestinal matter, from the mouth of the wound; an empty collapsed state of a portion of bowel, protruded at the opening in the skin, are the common symptoms attending a wound of this kind. When the wound is situated in the protruded portion, it is obvious to the surgeon's eye; but when it affects a part of the intestinal canal within the abdomen, the nature of the case can only be known by a consideration of other symptoms. In addition to such as I have already described, there are some others, which ordinarily accompany wounds of the bowels; as, for instance, oppression about the præcordia, acute or griping pain in the belly, cold sweats, syncope, &c. But unless the wounded intestine be protruded, there is no practical good in knowing, whether the bowel is injured or not, since, if it be in the abdomen, the treatment ought not to be materially different from that of a simple penetrating wound of the belly, unattended with a wound of any of the viscera. A wounded intestine is said to present some particular appearances, to which the generality of writers have paid no attention: "If a gut be punctured, the elasticity of the peritoneum, and the contraction of the muscular fibres, open the wound, and the villous, or mucous coat forms a sort of hernial protrusion, and obliterates the aperture. If an incised wound be made, the edges are drawn asunder and reverted, so that the mucous coat is elevated in the form of a fleshy lip. If the section be transverse, the lip is broad and bulbous, and acquires tumefaction and redness from the contraction of the circular fibres behind it, which produces, relatively to the everted portion, the appearance of a cervix. If the incision is according to the length of the cylinder, the lip is narrow, and the contraction of the adjacent longitudinal, resisting that of the circular fibres, gives the orifice an oval form. This eversion and contraction are produced by that series of motions, which constitutes the peristaltic action of the intestines." (*Travers on Injuries of the Intestines, p.* 85.)

According to this gentleman, some of these appearances were described by Haller, in *Element. Physiol. lib.* 21, *sect.* 2, *and Opera Minora, tom.* 1, *sect.* 15.

Having witnessed the facility, with which considerable injuries of the intestinal tube were repaired, Mr. Travers was desirous of ascertaining more fully the powers of nature in the process of spontaneous reparation, and of determining, under how great a degree of injury, it would commence, as well as the mode of its accomplishment. For these purposes, he divided the small intestine of several dogs as far as the mesentery. All these animals died, in consequence of the intestinal matter being extravasated, if they had been lately fed, or if they had been fasting in consequence of inflammation, attended with a separation of the ends of the divided bowel, eversion of the mucous coat, and obliteration of the cavity, partly, by this eversion, and partly by a plug of coagulated chyle.

In one particular instance in which Mr.

Travers made a division of the bowel, half through its diameter, a sort of pouch was formed round the injured intestine. "A pouch, resembling somewhat the diverticulum in these animals, was formed opposite to the external wound, on the side of the parietes, by the lining peritoneum, on the other side, by the mesentery of the injured intestine, that intestine itself, and an adjacent fold, which had contracted with it a close adhesion. The pouch, thus formed and insulated, included the opposed sections of the gut, and had received its contents, &c. The tube, at the orifices, was narrowed by the half eversion, but, offered no impediment to the passage of fluids." (*P.* 96.) Whether, under these circumstances, the functions of the alimentary canal could have been continued, Mr. Travers professes himself incapable of deciding. Among the inferences, which this gentleman has drawn from the experiments, detailed in his publication, the tendency of the two portions of a divided bowel to recede from each other, instead of coalescing to repair the injury, merits notice, in as much as it tends to shew, that the only means of spontaneous reparation consist in the formation of an adventitious canal, by the encircling bowels and their appendages. The everted mucous coat, which is the part opposed to the surrounding peritoneum, is also indisposed to the adhesive inflammation.

When, however, the wound of the intestine is smaller, the obstacles to reparation are not absolutely insurmountable. Here, retraction is prevented, and the processes of eversion and contraction modified by the limited extent of the injury. If, therefore, the adhesive inflammation unite the contiguous surfaces, effusion will be prevented, and the animal escape immediate destruction. But, union can only take place through the medium of the surrounding parts.

According to Mr. Travers, it is the retraction, immediately following the wound, that is a chief obstacle to the reparation of the injury; for, if the division be performed in such a way, as to prevent retraction, the canal will be restored in so short a time, as but slightly to interrupt the digestive function. In confirmation of this state, a ligature was tightly applied round the duodenum of a dog, which became ill, but entirely recovered, and was killed. "A ligature, fastened around the intestine, divides the interior coats of the gut, in this effect resembling the operation of a ligature upon an artery. The peritoneal tunic alone maintains its integrity. The inflammation, which the ligature induces on either side of it, is terminated by the deposition of a coat of lymph, which is exterior to the ligature, and quickly becomes organized. When the ligature, thus enclosed, is liberated by the ulcerative process, it falls of necessity into the canal and passes off with its contents." (*P.* 103—104.)

It appears also from Mr. Travers's experiments and observations, that longitudinal wounds of the bowels are more easily repaired, than such as are transverse. In a dog, a longitudinal wound, of the extent of an inch and a half, was repaired by the adhesive inflammation. Here the process of eversion is very limited; the aperture bears a smaller proportion to the cylinder of the bowel; and the entire longitudinal fibres resist the action of the circular, which are divided, and can now only slightly lessen the area of the canal. (*P.* 108).

We come now to the consideration of the treatment, which may be proper in cases of wounds of the intestines; a subject in which much difference of opinion has prevailed; principally, however, concerning the circumstances, in which sutures are necessary, and the most advantageous way of applying them.

When the wounded bowel lies within the cavity of the abdomen, no surgeon of the present day would have the rashness to think of attempting to expose the injured intestine, for the purpose of sewing up the breach of continuity in it. In fact, the surgeon seldom knows at first what has happened; and when the nature of the case is afterwards manifested, by the discharge of blood per anum, an extravasation of intestinal matter, &c, it would be impossible to get at the injured part of the bowel, not only because its exact situation is unknown, but, more particularly, on account of the adhesions, which are always formed with surprising rapidity. But, even if the surgeon knew, to a certainty, in the first instance, that one of the bowels was wounded, and the precise situation of the injury, no suture could be applied, without considerably enlarging the external wound, drawing the wounded intestine out of the cavity of the abdomen, and handling and disturbing all the adjacent viscera. Nothing would be more likely, than such proceedings, to render the accident, which may originally be curable, unavoidably fatal. I entirely agree upon this point with Mr. John Bell, who says, "When there is a wounded intestine, which we are warned of only by the passing out of the feces, we must not pretend to search for it, nor put in our finger, nor expect to sew it to the wound; but we may trust, that the universal pressure, which prevents great effusion of blood, and collects the blood into one place, that very pressure, which always causes the wounded bowel and no other to protrude, will make the two wounds, the outward wound and the inward wound of the intestine, oppose each other, point to point; and, if all be kept there quiet, though but

for one day, so lively is the tendency to inflame, that the adhesion, will be begun, which is to save the patient's life." (*Discourses on Wounds, p.* 361, *edit.* 3.)

When the extravasation, and other symptoms, a few days after the accident, shew the nature of the case, a suture can be of no use whatever, as the adhesive inflammation has already fixed the part in its situation, and the space, in which the extravasation lies, is completely separated from the general cavity of the abdomen, by the surrounding adhesions.

When the bowel is not protruded, and the opening in it is situated closely behind the wound in the peritoneum, a suture is not requisite, for the contents of the gut not passing onward, will be discharged from the outer wound, and not be diffused among the viscera, if care be taken to keep the external wound open. There is no danger of the wounded bowel changing its situation, and becoming distant from the wound in the peritoneum, for the situation which it now occupies, is its natural one. Nothing, but violent motion, or exertions, could cause so unfavourable an occurrence, and, these should always be avoided. The adhesions, which take place in the course of a day or two, at length render it impossible for the bowel to shift its situation.

Things, however, are far different when the wounded part of the bowel happens to be protruded. Here we have the authority of all writers, in sanction of the employment of a suture. No enlargement of the outer wound is requisite to enable the practitioner to adopt such practice; there is no disturbance created by the adjacent parts; there is no doubt concerning the actual existence of the injury; no difficulty in immediately finding out its situation.

But, though authors are so generally agreed about the propriety of using a suture, in the case of a wounded and protruded bowel, they differ exceedingly, both as to the right object of the method, and the most advantageous mode of sewing the injured part of the intestine. Some have little apprehension of extravasation, advise only one stitch to be made, and use the ligature chiefly with a view of confining the injured bowel near the external wound, so that, in the event of an extravasation, the effused matter may find its way outward. Other writers wish to remove the possibility of extravasation, by applying numerous stitches, and attach little importance to the plan of using the ligature principally for the purpose of keeping the intestine near the superficial wound.

When the wound of a bowel is so small, that it is closed by the protrusion of the villous coat, the application of a suture must evidently be altogether needless, and since the ligature would not fail to cause irritation, as an extraneous substance, the employment of it ought unquestionably to be dispensed with.

Supposing, however, the breach in the intestine to be small, but yet sufficient to let the feces escape, what method ought to be adopted? The following practice seems rational. As Mr. Astley Cooper was performing the operation for a strangulated hernia, at Guy's hospital, an aperture, giving issue to the intestinal contents, was discovered in a portion of the sound bowel, just when the part was about to be reduced. The operator, including the aperture in his forceps, caused a fine silk ligature to be carried beneath the point of the instrument, firmly tied upon the gut, and the ends cut off close to the intestine. The part was then replaced, and the patient did well. Mr. Travers, who has related this fact, approves of the plan of cutting away the extremities of the ligature, instead of leaving them hanging out of the external wound. It appears, that, when the first practice is followed, the remnant always makes its way into the intestine, and is discharged with the stools, without any inconvenience. But, when the long ends are drawn through the outer wound, and left in it, they materially retard the process of healing. (*See Travers on Injuries of the Intestines, &c. p.* 112, 113.)

Let us now enquire into what ought to be the conduct of a surgeon, should he be called to a patient, whose bowel is divided through its whole cylinder, and protruded out of the external wound.

Various have been the schemes and proposals, for the treatment of this sort of accident; and since experience has furnished few practitioners with an opportunity of seeing such a case in the human subject, a variety of experiments have been made on animals, in order to determine what treatment would be the most successful. Ramdohr, indeed, is stated by Moebius, to have had occasion to try, on the human subject, a plan, of which a vast deal has been said and written. He cut off a large part of a mortified intestine, and joined the two sound ends together, by inserting the upper within the lower one, and fixing them in this position with a suture, the ligature being also employed to keep them at the same time near the external wound. The patient recovered, and the feces continued to pass entirely by the rectum in the natural way. (See *Halleri Disput. Anat. Vol.* 6. *Obs. Med. Miscellan.* 18.)

Moebius attempted to repeat Ramdohr's operation upon a dog; but, he could not succeed in insinuating the upper part of the divided bowel into the lower one, on account of the contraction of the two ends of the intestinal tube, and the smallness of the canal. Moebius, therefore, was obliged to be content with merely bringing the ends of the bowel together with a su-

ture: the animal died, however, of an extravasation of the feces.

Dr. Smith, of the Philadelphia Medical Society, also tried to repeat Ramdohr's method, but could not succeed. He divided the intestine of a dog transversely, and having inserted a piece of candle into that portion of the bowel, which was supposed to be uppermost, he endeavoured to introduce the superior within the inferior; but, the ends became so inverted, that it was found utterly impossible to succeed. The scheme was therefore given up, and only one stitch made, the ligature being then attached to the external wound, in the manner advised by Mr. John Bell. The dog died, and, on examination, there was found a considerable quantity of feces and water in the abdominal cavity.

Two other trials were made of Mr. John Bell's plan by Dr. Smith, on the intestines of dogs: in both instances the animals died, the intestines being much inflamed, and feces effused in the abdomen. (See *Dr. Smith's Thesis.*)

Mr. Travers likewise tried the same experiment. "I divided the small intestine of a dog, which had been for some hours fasting, and carried a fine stitch through the everted edges, at the point opposite to their connexion with the mesentery. The gut was then allowed to slip back, and the wound was closed. The animal survived only a few hours. *Examination.* The peritoneum appeared highly inflamed. Adhesions were formed among the neighbouring folds, and lymph was deposited in masses upon the sides of the wounded gut. This presented two large circular orifices. Among the viscera were found a quantity of bilious fluid, and some extraneous substances, and a worm was depending from one of the apertures. By the artificial connexion of the edges in a single point of their circumference, and their natural connexion at the mesentery, they could recede only in the intervals, and here they had receded to the utmost." In another experiment, Mr. Travers increased the number of points of contact, by placing three single stitches upon a divided intestine, cutting away the threads, and returning the gut. The animal died on the second day. *Examination.* Similar marks of inflammation presented themselves. The omentum was partially wrapped about the wound; but, one of the spaces, between the sutures was uncovered, and from this the intestinal fluids had escaped. On cautiously raising the adhering omentum, the remaining stitches came into view. Here again the retraction was considerable, and the intervening elliptical aperture proportionally large. On the side, next to the peritoneum, however, the edges were in contact and adhered, so as to unite the sections at an angle.

From such experiments, the conclusion, drawn by Mr. Travers, is, that apposition, at a point, or points, is, as respects effusion, more disadvantageous, than no apposition at all; for, it admits of retraction, and prevents contraction, so that each stitch becomes the extremity of an aperture, the area of which is determined by the distance of the stitches. (*P.* 116, 119.) This gentleman, therefore maintains, *that the absolute contact of the everted surfaces of a divided intestine, in their entire circumference, is requisite to secure the animal from the danger of abdominal effusion.* (*P.* 121.) The species of suture employed (says Mr. Travers) is of secondary importance, if it secures this contact. (*P.* 134.) And among other observations, I find "wounds amounting to a *direct* division of the canal are irreparable, and therefore invariably fatal." (*P.* 133.)

Without entertaining the least desire to give offence, I confess, I do not know what could induce Mr. Travers to be so positive in these inferences. We are told, that apposition at a point, or points, is, as respects effusion, more disadvantageous than no apposition at all, and that the absolute contact of the divided surfaces, in their entire circumference, is requisite to secure the animal from the danger of abdominal effusion. The foundation of these unqualified conclusions is five experiments, made on dogs, in four of which experiments, the divided bowel was brought together with one stitch, on Mr. John Bell's plan, while, in another three stitches were made; and, yet, in all these instances, the animals died with the contents of the bowels effused. So far the inferences seem established. Unfortunately, for their stability, however, Mr. Travers immediately afterwards proceeds to relate other experiments, instituted by Mr. Astley Cooper, Dr. Thomson, and Dr. Smith, which, though Mr. Travers seems unaware of the fact, tend most completely to overturn the conclusions which he had been previously making.

"Mr. Cooper repeated the experiments of Duverger, who had succeeded, in uniting by suture, the divided intestine of a dog, including in it a portion of the trachea of a calf. In place of the uninterrupted suture, three distinct stitches were inserted. On the sixteenth day, the animal was killed, and the union was complete." (*P.* 123.)

Here we have two facts, proving that a wounded intestine may be united, though the suture was not such, as to maintain the divided surfaces in contact, in the whole of their circumference.

Mr. Astley Cooper then made the experiment, without including the foreign substance. The animal recovered, being a third fact, tending to shew, that the ab-

solute contact of every point of the ends of the divided bowel is not essential to the cure. (See *A. Cooper on Inguinal and Congenital Hernia. Chap. II.*)

After dividing the small intestine of a dog, Dr. Thomson, Regius professor of Military Surgery at Edinburgh, applied five interrupted stitches, at equal intervals, the ends of the ligatures, were cut off, and the external wound was closed with a suture. This animal did not die of the operation, and, when he was afterwards killed, it appeared, that the threads had made their way into the interior of the intestinal canal. Dr. Thomson repeated this experiment, and did not kill the animal till six weeks afterwards, when the same tendency of ligatures to pass into the bowels, and be thus discharged, was exemplified.

These two last cases make five, in proof that the absolute contact of every part of the ends of a divided bowel is not essential to prevent effusion, or the consequences of the wound from proving fatal; and several other experiments were made by Dr. Smith, of Philadelphia, who employed four stitches, with similar success.

As far then as the majority of such facts ought to have weight, we are bound to receive the conclusions of Mr. Travers as incorrect, and unestablished. I am only surprised, that Mr. Travers himself, who has cited the particulars of all these last experiments, did not perceive, that they struck directly at his own inferences. They are not only irresistible arguments against Mr. Travers's conclusion, that the union of a divided bowel requires the contact of the cut extremities in their entire circumference; but, they are a plain denial of another position, advanced by this author, viz. that wounds, amounting to a direct division of the canal are irreparable, and, therefore, invariably fatal.

With respect to the species of suture being of secondary importance, provided it secure the complete contact of every part of the everted ends of the divided bowel, I regret, that Mr. Travers has omitted to institute experiments, in order to shew, that any such suture can be practised, and, if he has the ingenuity to apply it, whether the result would be for, or against, the conclusions, which he has formed. The fact of the sutures always making their way into the cavity of the bowel, and being thus got rid of, appears to me highly interesting, since it shews the safety of cutting away the ends, instead of leaving them hanging out of the external wound, so as to create the usual irritation and inconveniences of extraneous substances. It seems, that Mr. Benjamin Bell first recommended cutting the ends of the ligatures away, and reducing the bowel in this state into the abdomen, as he says, a considerable part of the remainder of the ligature will fall into the cavity of the gut. (*System of Surgery, Vol. II. p.* 128, *Edit.* 7.) We have seen, that the experiments of Dr. Thomson confirm the observation, and those, instituted by Mr. Travers, tend to the same conclusion.

According to the latter writer, the following is the process by which a divided intestine is healed, when sutures are employed. "It commences with the agglutination of the contiguous mucous surfaces, probably, by the exudation of a fluid, similar to that, which glues together the sides of a recent flesh wound, when supported in contact. The adhesive inflammation supervenes, and binds down the everted edges of the peritoneal coat, from the whole circumference of which a layer of coagulable lymph is effused, so as to envelope the wounded bowel. The action of the longitudinal fibres, being opposed to the artificial connexion, the sections mutually recede, as the sutures loosen by the process of ulcerative absorption. During this time, the lymph deposited becomes organized, by which further retraction is prevented, and the original cylinder, with the threads attached to it, is encompassed by the new tunic.

"The gut ulcerates at the points of the ligatures, and these fall into its canal. The fissures, left by the ligatures, are gradually healed up; but, the opposed villous surfaces, so far as my observation goes, neither adhere, nor become consolidated by granulation, so that the interstice, marking the division internally is probably never obliterated." (*Travers on Injuries of the Intestine, &c. p.* 128.)

Notwithstanding I have carefully read all the arguments adduced by Mr. Travers in favour of stitching a divided bowel at as many points as possible, I still remain unconvinced of the advantage of such practice, for reasons already suggested. If a case were to present itself to me, in which a bowel was protruded and partly cut through, I should apply only a single suture, made with a common sewing needle, and a piece of fine silk. If the bowel were completely cut across, I should have no objection to attach its ends together by means of two or three stitches of the same kind. I coincide with Mr. Travers respecting the advantage of cutting off the ends of the ligature, instead of leaving them in the wound, as I believe he is right, in regard to the little chance there is of the injured intestine receding far from the wound, and if the ends of the ligature are then of no use in keeping the bowel in this position they must be objectionable, as extraneous substances.

Sometimes, only one end of the divided gut protrudes at the wound, and, the other lies concealed in the cavity of the abdomen. If the hidden continuation of the intestinal canal, cannot be found without enlarging the wound, it may be questioned, whether the urgency of the case does not justify this practice. If the upper end should happen to be the one concealed in the abdomen, almost certain death must result from its continuance there; if it be the lower one, and no attempt be made to find it, the patient can only survive with the loathsome affliction of an artificial anus.

When the protruded intestine is mortified, which must be a very rare occurrence in cases of wounds, the surgeon's conduct should be the same as in a mortified enterocele. (See *Hernia.*)

With regard to the constitutional treatment, in wounds of the intestines, the principal indication is to prevent a dangerous degree of inflammation. Hence bleeding and the antiphlogistic treatment are highly indispensable. Let not the surgeon be deterred from putting such practice in execution by the apparent debility of the patient, his small concentrated pulse, and the coldness of his extremities, symptoms, common in acute inflammation of the bowels, and, in fact, themselves indicating the propriety of repeated venesection. Wounds of the small intestines are attended with more vehement inflammation, than those of the large ones. All flatulent, stimulating, and solid food, is to be prohibited. The bowels are to be daily emptied with glysters, by which means, no matter will be allowed to accumulate in the intestinal canal, so as to create irritation and distention.

When excrementitious matter is discharged from the outer wound, it is highly necessary to clean and dress it very frequently. Gentle pressure should also be made, with the fingers, at the circumference of the wound, at each time of applying the dressings, for the purpose of promoting the escape of any extravasated matter. For the same reason, the patient should always lie, if convenient, in a posture that will render the external opening a depending one.

After a day or two, the surgeon need not be afraid of letting the outer wound heal up; for the adhesive inflammation, all around the course of the wound, will now prevent any extravasated matter from becoming diffused among the viscera. If the case should end well, the intestine generally undergoes a diminution in its diameter at the place where the wound was situated. When this contraction is inconsiderable, the patient occasionally experiences colic pains at the part, especially after eating such food, as tends to produce flatulence. As these pains usually go entirely off after a certain time, and no inconvenience whatsoever remains, the intestine may possibly regain its wonted capacity again. A more considerable constriction of the above sort has been known to have occasioned a fatal miserere. Even the intestine itself has been known to burst in this situation, after its contents had accumulated behind the contracted part. Patients, who have recovered from wounds of the intestines, should ever afterwards be particularly careful not to swallow any hard substances, or indigestible, flatulent food.

In some instances, intestinal matter continues to be discharged from the outer wound, either in part, or entirely, so that either a fistula, or an artificial anus is the consequence. A fistula is more apt to follow, when an intestine has been injured by a ball, has been quite cut through, or has mortified. But, numerous cases have evinced, that this is not invariably the consequence, and that a perfect cure has frequently followed each of these occurrences.

When an intestine is completely cut through, and the lower portion of the canal lies inaccessibly concealed in the abdomen, there is a necessity for promoting the formation of an artificial anus. In this particular case, the extremity of the intestine is to be attached, with a fine suture, to the edges of the outer wound. In order to distinguish the upper end of the intestine from the lower one, some recommend giving the patient some milk to drink, and to wait a little, to see whether the fluid issues from the mouth of the gut. In the mean while, they content themselves with applying fomentations. If the upper end of the intestine should be in the abdomen, it certainly seems justifiable, when the accident is quite recent, to dilate the outer wound sufficiently to see, whether the part is near enough to be got at. If the surgeon should succeed in this object, the two ends of the bowel ought to be sewed together, as above directed.

In gun-shot wounds of the abdomen, the treatment is limited to the employment of general means. For information, relative to wounds of the abdomen, see *Richter's Anfangsgrunde der Wundarzneykunst, Band 5. Kap. 1. Discourses on the Nature and Cure of Wounds, by John Bell, Edit. 3. Encyclopédie Méthodique, Partie Chirurgicale, Art. Abdomen, and Intestins. Dr. Smith's Inaugural Thesis. An Enquiry into the Process of Nature in repairing Injuries of the Intestines, &c. by B. Travers. Hunter on Gun-shot Wounds. Mr. A. Cooper's work on Inguinal and Congenital Hernia, Chap. II. Sabatier's Médecine Opératoire, Tom. 1. Essai sur les Epanchemens, and Suite de l'Essai sur les Epanchemens par M. Petit,*

le fils, in Mem. de l'Acad. de Chirurgie, Tom. 2 and 4, Edit. in 12mo.

ABSCESS. This term signifies a tumour containing pus, or a collection of purulent matter. Authors differ about the original derivation of the word. The most common opinion is, that it comes from the Latin *abscedo, to depart*, because parts, which were before contiguous, become separated, or depart from each other.

Abscesses are divided into two principal kinds, viz. *acute* and *chronic*. For every thing, relative to the former, see *Suppuration;* and, for information, concerning the latter, refer to *Lumbar Abscess*. The *Mammary Abscess* is a distinct article. See also the articles, *Antrum, Anus Abscesses of, Bubo, Empyema, Hypopium, Whitlow, &c.*

ACANTHA'BOLUS. (from ακανθα, a thorn, and βαλλω, to cast out.) An instrument for taking thorns out of the flesh, and described by Paulus Ægineta. It is said to be like an instrument called the volsella, used for extracting bones from the œsophagus, and foreign substances from wounds.

A'CCIPITER, (a hawk.) The name of a bandage, which was formerly employed by surgeons for covering the nose: it derived its name from its supposed resemblance to a hawk's claw.

ACCRE'TION. A growing together of parts, as of the toes, or fingers to each other, in consequence of burns, &c.

ACETUM. *Vinegar.* (From *aceto*, to be acid.) Called in the last Pharmacopœia of the London College, *Acidum Aceticum*. Vinegar is an article of very considerable use in surgery. Mixed with farinaceous substances, it is frequently applied to sprained joints, and, in conjunction with alcohol and water, it makes an eligible lotion for inflammations of the surface of the body. Vinegar has acquired reputation at the Gloucester Infirmary, for quickening the exfoliation of dead bone, which effect may be owing to its property of dissolving the phosphate of lime. The excellent effects of vinegar, when immediately applied to burns and scalds, have been taken particular notice of by Mr. Cleghorn, a brewer in Edinburgh, who communicated his sentiments to Mr. Hunter. (See *Med. Facts and Observations, Vol. II.*) *See the Article, Burns.*

In chronic inflammations of the eyes and eyelids, vinegar has lately been brought into considerable repute. It is also recommended as an application, in certain instances, in which the eyes are weak and watery. It is said to be an efficacious remedy even in cases of acute ophthalmy, after topical and general bleeding. Whenever vinegar is applied to the eye, it is in a diluted state, as may be seen in another part of this work. (See *Collyrium Acidi Acetici.*)

Very strong vinegar may be obtained by freezing and separating the water, which is mixed with the acid. When thus concentrated, it is said to be an excellent styptic for stopping hæmorrhage from the nose. With this view, it may be used either as an injection, or a lotion, in which lint is to be dipped, and afterwards introduced up the nostril.

ACHILLES, *Tendon of.* So called, because as fable reports, Thetis, the mother of Achilles, held him by that part, when she dipped him in the river Styx, to make him invulnerable. It signifies that great and powerful tendon, which is formed by the junction of the gastrocnemius and soleus muscles, and which extends along the posterior part of the tibia, from the calf to the heel. When this tendon is unfortunately cut, or ruptured, as it may be, in consequeence of a violent exertion, or spasm of the muscles, of which it is a continuation, the use of the leg is immediately lost, and unless the part be afterwards successfully united, the patient must remain a cripple for life.

The ancient surgeons seem not to have been well acquainted with the rupture of the tendo Achillis, which they probably might mistake for a sprain, or some other complaint. In cases, in which this part had been cut, they recommended approximating the separated portions, and maintaining them in contact by means of a suture.

When the ruptured tendo Achillis, was afterwards better understood, the plan, just mentioned, was even adopted in this case, the integuments having been previously divided, for the purpose of bringing the tendon into view. But, there is no necessity for having recourse to this painful proceeding. (*Encyclopédie Méthodique, Partie Chirurgicale, Tom. 1, p. 55.*)

The superficial situation of the tendo Achillis, always renders the diagnosis of its rupture exceedingly obvious, and the accident can only become at all difficult to detect, when there is a considerable degree of swelling, which is very rare. When the tendon has been cut, the division of the skin even allows the accident to be seen. When the tendon has been ruptured, the patient hears a sound, like that of the smack of a whip, at the moment of the occurrence. In whatever way the tendon has been divided, there is a sudden incapacity, or, at least, an extreme difficulty, either of standing or walking. Hence, the patient falls down, and cannot get up again. Besides these symptoms there is a very palpable depression, between the ends of the tendon, which depression is increased when the foot is bent, and diminished, or even quite removed, when the foot is extended.

The patient can spontaneously bend his foot, none of the flexor muscles, being in-

terested. The power of extending the foot is still possible, as the peronei muscles, the tibialis posticus, and long flexors, remain perfect, and may perform this motion. (*Œuvres Chirurgicales de Desault par Bichat, Tom.* 1.)

The indications are to bring the ends of the divided part together, and to keep them so, until they have become firmly united. The first object is easily fulfilled by putting the foot in a state of complete extension; the second, namely, that of keeping the ends of the tendon in contact, is more difficult.

In order to have a right comprehension of the indications, we should consider what keeps the ends of the tendon from being in contact. The flexion of the foot has this effect on the lower portion; the contraction of the gastrocnemius, and soleus on the upper one. The indications then are to put the foot in an unalterable state of extension, and to counteract the action of the above muscles.

The action of the muscles may be opposed: 1. By keeping these powers in a continual state of relaxation. For this purpose, the leg must be kept half bent upon the thigh. 2. By applying methodical pressure to the muscles; methodical, because it is to operate on the fleshy portion of the muscles, and not on the tendon, the ends of which being depressed by it, would be separated from each other, and, instead of growing together, would unite to the adjacent parts. The pressure should also operate so as to prevent the ends of the tendon from inclining either to the right or left.

This kind of pressure, which the bandage ought to make, seems to have escaped the attention of all authors. Who cannot see, however, that the action of the muscles being by this means resisted, the upper end of the tendon will not have such a tendency to be drawn upward, and separated from the lower one? (*Œuvres Chirurgicales de Desault par Bichat, Tom.* 1.)

The famous Petit seems entitled to the honour of having first devised the plan of treating the ruptured, or divided tendo Achillis, by keeping the leg and foot in a particular posture, with the aid of an apparatus. Seing that the extension of the foot brought the ends of the tendon into contact, it occurred to him that such extension should be maintained during the whole of the treatment, in order to bring about a permanent union. This happy idea, the simplicity of which should have rendered it obvious to all practitioners, once having originated, became the common basis, on which have been founded all the numerous methods of cure, which have been since recommended. (*Desault par Bichat.*)

The celebrated Dr. Alexander Monro, professor of anatomy at Edinburgh, happened to rupture his tendo Achillis. When the accident took place, he heard a loud crack, as if he had suddenly broke a nut with his heel, and he experienced a sensation, as if the heel of his shoe had made a hole in the floor. This sensation, he says, has also been observed by others, though some have complained of a smart stroke, like what would be produced by a stone or cane. Immediately suspecting what had happened, the doctor extended his left foot, in which the occurrence had taken place, as strongly as he could with his right hand, while with the left, he pressed the muscles of the calf downward, so as to bring the ends of the broken tendon as near together as possible. In this position he sat, until two surgeons came to his assistance. They applied compresses, and a bent board to the upper part of the foot, and forepart of the leg, both which they kept, as nearly as possible, in a straight line, by a tight bandage, made with a long roller. But, as this mode of dressing soon became very uneasy, it was changed for the following one. A foot-sock, or slipper, was made of double quilted ticking, from the heel of which a belt or strap projected, of sufficient length to come up over the calf of the leg. A strong piece, of the same materials, was prepared of sufficient breadth to surround the calf, and this was fastened with lacings. On the back part of this was a buckle, through which the strap of the foot-sock was passed, so that the foot could be extended, and the calf brought down at pleasure. The leg and foot were wrapt up in soft flannel, fumigated with benzoin, and the bandage was kept on day and night, the belt being made tighter, when the doctor was about to go to sleep, and loosened when he was awake, and on his guard. For a fortnight, he did not move his foot and leg at all, but, was conveyed in a chair on castors from one part of the room to another. After this, he began to move the ankle-joint, but in such a gentle manner as not to give any pain. The degree of motion was gradually increased, as the tendon became capable of bearing it, care being taken to stop, when the motion began to create uneasiness. The affected limb was moved in this way, for half an hour at a time. In a few days, the hollow, between the separated ends of the tendon, became imperceptible, though the part continued soft much longer. It became, however, gradually thicker and harder until a knot was at last formed in it, apparently of a cartilaginous nature. Though this was at first as large as a middling plum, and gradually became softer and smaller, yet it did not disappear entirely. Having occasion to go out six weeks after the accident, the doctor put

on a pair of shoes, with heels two inches high, and contrived a steel machine to keep his foot in the proper position. This machine, however, he afterwards changed for another, made of the same materials as the former. It was not till five months after the accident, that he thought proper to lay aside all assistance, and to put the strength of the tendon to a trial. (See *Monro's Works*, p. 661.)

It seems unnecessary to enumerate the various plans, devised since the time of Petit. Suffice it to state, that both in a wound and rupture of the tendo Achillis, the ancient method of using a suture, for keeping the ends of the tendon in contact, is at present quite exploded, and position of the limb is the grand agent, by which the cure is now universally accomplished. The following was Desault's method, which, though it was expressly designed to fulfil all the above-mentioned indications, may not after all be a more valuable practical plan, than the one adopted by Dr. Monro. After the ends of the tendon had been brought into contact, by moderate flexion of the knee, and complete extension of the foot, Desault used to fill up the hollows, on each side of the tendon with soft lint and compresses. The roller, applied to the limb, made as much pressure on these compresses, as on the tendon, and hence this part could not be depressed too much against the subjacent parts. Desault next took a compress, about two inches broad, and long enough to reach from the toes to the middle of the thigh, and placed it under the foot, over the back of the leg, and lower part of the thigh. He then began to apply a few circles of a roller round the end of the foot, so as to fix the lower extremity of the longitudinal compress. After covering the whole foot with the roller, he used to make the bandage describe the figure of 8, passing it under the foot, and across the place where the tendon was ruptured, and the method was finished by encircling the limb upward, with the roller, as far as the upper end of the longitudinal compress. (*Desault par Bichat.*)

Certainly this plan seems to answer every object, and may be worthy of being adopted in this country. The continued pressure on the muscles of the calf, by which their action is materially resisted, is too much disregarded by the generality of English surgeons. Consult *Monro's Works*; *Encyclopédie Méthodique, Article Achille, tendon d', and Mémoire sur la division du tendon d' Achille, in Œuvres Chirurgicales de Desault par Bichat, Tom.* 1, *p.* 306.)

ACHORES, (from ἀχώρις, bran.) The scald head, so called from the branny scales thrown off it. (See *Tinea Capitis.*)

ACIDUM NITROSUM, now called by the London College, ACIDUM NITRICUM. Dr. Rollo, Mr. Cruikshank, Dr. Beddoes, Mr. Blair, and many others have tried this acid, as a substitute for quicksilver in the cure of the lues venerea. The practice began with Mr. Scott, a surgeon in Bengal, who is said to have caught the idea from Dr. Girtanner, who suggested, that the efficacy of the various preparations of quicksilver might arise from the oxygen, which they contained.

A multitude of cases have been brought forward in favour of nitric acid, as an antisyphilitic, but, there are also some others adduced, which seem very decidedly to controvert its claims to that character. It should be carefully remembered, that it is the *nitric* acid, not the *nitrous*, which seems to deserve a further trial in syphilitic cases.

Mr. Pearson is of opinion, that the power of this medicine has not yet been ascertained in so satisfactory a way as to preclude all difference of opinion on the subject.

Another writer says, that the symptoms of confirmed lues venerea are not removed by nitrous acid; but, that the medicine has been used both liberally and successfully for removing the debilitating effects of mercury, for giving tone to the stomach, improving the appetite, and imparting a granulating and healthy aspect to certain ulcers remaining after a due course of mercury had been tried, and which were aggravated by persevering in the use of the latter medicine. The effects of this acid in syphilis, will be more particularly noticed, in the article *Venereal Disease*.

Nitrous acid, given in doses of eight, ten, or fifteen drops, two, or three times a day, is said to have proved particularly efficacious in the cure of some eruptive complaints, especially of the lower extremities, and joined with disorder of the liver. (*Wilson's Pharm. Chirurgica, p.* 6.)

The common way of giving the nitric acid, at first, is to mix ʒj with a pint of distilled water, the mixture being sweetened with simple syrup. This quantity is to be drank, at different times, in the course of 24 hours, through a small glass tube, which is used to keep the teeth from being injured. If no inconvenience is felt, the dose of the acid may be increased to ʒiss, ʒij, and even, in certain cases, to ʒiij.

The acid is said to increase the appetite, and secretion of urine; to cause more or less thirst, a white tongue, sizy blood, and an increase in the actions of the whole system, but nothing like mercurial salivation is produced. It does not agree, however, equally well with all constitutions.

The nitric acid is beneficial both in the *primary* and *secondary* symptoms of the ve-

nereal disease; more so, however, in the former. But, in the latter, even mercury itself frequently fails, and proves hurtful, so that the nitric acid suffers no disparagement from this fact. A change is said to be produced on the disease, by the acid, in six or eight days, and a cure very often in little more than a fortnight.

The oxygenated muriate of pot-ash which contains an immense quantity of oxygen, is said by Mr. Cruickshank, to be more efficacious than the nitric acid in relieving venereal symptoms.

A'CME. (from *ακμη*, a point.) The highest pitch of a disease.

A'CNA, or A'CNE. (from *ακνη*, bran, or chaff.) A hard, purplish tubercle in the face, covered with a scale.

A'CORES. See *Achores*.

ACOU'STICS. Medicines, or instruments to assist the hearing. The term is derived from *ακουω*, to hear.

ACROMION. (from *ακρον*, the top, and *ωμος*, the shoulder.) The process of the scapula, articulated with the external end of the clavicle, and formed by the anterior and superior projecting part of the spine of the scapula. It is liable to be broken. (See *Fracture*.)

ACTUAL CAUTERY. A heated iron formerly much used in surgery for the extirpation and cure of diseases. The instrument was made in various shapes, adapted to different cases, and it was often applied through a cannula, in order that no injury might be done to the surrounding parts. *Actual* cauteries were so called in opposition to other applications, which, though they were not really hot, produced the same effect as fire, and, consequently, were named *virtual*, or *potential cauteries*.

ACUPUNCTURE. (from *acus*, a needle, and *pungo*, to prick.) The operation of making small punctures in certain parts of the body with a needle, for the purpose of relieving diseases, as is practised in Siam, Japan, and other oriental countries, for the cure of headachs, lethargies, convulsions, colics, &c. (See *Phil. Trans. No.* 148.)

ACUTENACULUM. (from *acus*, a needle, and *teneo*, to hold.) Heister so denominates the port aiguille. It is a handle for a needle, to make it penetrate the flesh more easily.

ADAMITA. Lithiasis, or the stone in the bladder. (See *Urinary Calculi* and *Lithotomy*.)

ADHESIVE INFLAMMATION.—That kind of inflammation, which makes parts of the body adhere, or grow together. It is the process, by which recent incised wounds are often united, without any suppuration, and it is frequently synonymous with union by the first intention. (See *Union by the First Intention*.)

ADYNA'MIA. (from *α*, neg. and *δυναμις*, strength.) Extreme debility.

ÆGIAS. (from *αιξ*, a goat.) A white speck upon the cornea, opposite the pupil, and so named from the supposition, that goats were very subject to such a disorder.

ÆGI'DES. (from *αιξ*, a goat.) Small white scars, or opacities, on the cornea.

ÆGYLOPS. (from *αιξ*, a goat, and *ωψ*, an eye.) A disease, so named from the supposition that goats were very subject to it. The term means a sore just under the inner angle of the eye.

The best modern surgeons seem to consider the ægylops, only as a stage of the fistula lachrymalis. Mr. Pott remarks, when the skin covering the lachrymal sac has been for some time inflamed, or subject to frequently returning inflammations, it most commonly happens, that the puncta lachrymalia are affected by it, and the fluid, not having an opportunity of passing off by them, distends the inflamed skin, so that, at last, it becomes sloughy, and bursts externally. This is that state of the disease, which is called perfect *aigylops*, or *ægylops*. (*Pott on Fistula Lachrymalis*.)

Ægylops was a very common term with the old surgical writers, who certainly did not suspect, that obstruction in the lachrymal parts of the eye, is so frequently the cause of the sore, as it really is. The skin over the lachrymal sac must undoubtedly be, like that in every other situation, not exempt from inflammation and abscesses; but, we do not find, that sores, unconnected with disease of the lachrymal sac, are so frequent, as to merit a distinct appellation. The term, ægylops is therefore going more and more into disuse, every day.

ÆRUGO, (*Subacetas Cupri Impura*) prepared verdigrease is by some used as an application to incipient chancres. Its acting as a caustic, and completely destroying the diseased surface at once, seems to offer a chance of preventing the absorption of the venereal matter, and, consequently, of doing away the necessity of making the patient undergo a salivation. However, it is perhaps never safe to rely solely upon this mode of treatment, without exhibiting mercury, in some form, or another.

Whenever the plan is tried, and it is certainly a very rational one, as long as the chancre is very small and recent, it is better to employ the argentum nitratum, which is a more active caustic, and for this reason, more sure to destroy the whole surface of the sore.

AGARIC. A species of fungus, growing on the oak, and much celebrated formerly for its efficacy in stopping bleeding. (See *Hemorrhage*.)

AGGLUTINATION. The union of parts; the adhesion of parts together, by an effusion of coagulating lymph, followed by a communication of vessels.

AGGLUTINANTS. Applications employed with a view of giving an opportunity for the opposite surfaces of a wound to adhere and grow together.

AGO'MPHIASIS. (from *a*, neg. and γομφος, compact). A painful looseness of the teeth.

AIR. For an account of the absurd opinions entertained, concerning its entrance into several cavities of the body, and its pernicious effects there, see *Abdomen*.

ALBORA. A species of itch, or rather leprosy.

ALBUGO, (from *albus*, white). A white opacity of the cornea, not of a superficial kind, but affecting the very substance of this membrane. This disease is very similar to the leucoma, with which it will be considered. (See *Leucoma*).

ALNUS, (the Alder Tree). The leaves, when cut in small pieces, and applied to the breast, as warm as can be borne, are much praised by professor Murray, of Gottingen, for their efficacy in discussing the milk of women, who do not suckle.

ALPHONSIN is the name of an instrument for extracting balls. It is so called from the name of its inventor Alphonso Ferrier, a Neapolitan physician. It consists of three branches, which separate from each other by their elasticity, but are capable of being closed by means of a tube, in which they are included.

ALUM. (an Arabic word.) Alum, either in its simple state, or deprived of its water of crystallization, by being burnt, has long been used in surgery. The ingenious author of the Pharmacopoeia Chirurgica remarks, that unless for external use, as a dry powder, the virtues of alum are not improved by exposure to fire. Ten grains of alum made into a bolus with conserve of roses, are given thrice a day at Guy's Hospital, in such cases, as demand powerful tonic, or astringent remedies. In a relaxed state of the urinary passages, or want of power of the sphincter vesicæ, small doses of alum have been found of service.

It is also recommended by Dr. Percival, to counteract the poison of lead. Burnt alum is a mild caustic, and is a principal ingredient in most styptic powders.

ALVINE CONCRETIONS. Surgical writers have recorded many instances, in which concretions of various sizes, and producing a series of very bad and even fatal complaints have been formed round plum and cherry stones in the alimentary canal. The knowledge of the dangerous consequences, which may ensue from swallowing such indigestible bodies, cannot be too extensively diffused; for, it is certain, that this pernicious habit of children and thoughtless persons is by no means uncommon, and must be a more frequent occasion of ill-health, if not of death, than is generally supposed.

The symptoms induced by the lodgment of concretions of the above kind in the bowels are of a formidable description: severe pains in the stomach and bowels, diarrhœa, violent vomitings of blood and mucus, a discharge of thin fetid matter from the rectum, a difficulty of voiding the excrement, an afflicting tenesmus, extreme emaciation, and debility.

That the foregoing account is not at all exaggerated may be seen by a perusal of the cases, and remarks published on the subject by Mr. Charles White, of Manchester, and Mr. Hey, of Leeds.

I shall take the liberty of quoting a case from each of these gentlemen. The first example is one related by Mr. White, shewing the proper mode to be pursued, when practicable.

"On March 2, 1762, Dr. Brown desired I would visit J. Parkinson, of Manchester, an out-patient of the infirmary, who had been some time under his care for complaints much resembling nephrytic paroxysms, which the medicines, usual in such cases, had frequently relieved. The night before he had perceived a lump in the rectum, which had brought on a continual tenesmus. I found him extremely emaciated; the sphincter ani very much dilated, with a continual discharge of thin, excrementitious, and very fetid matter. Upon introducing my finger into the anus, I very distinctly felt a large body moveable in the rectum, which I easily took hold of with a pair of forceps, such as are used in lithotomy, and immediately brought away without much difficulty. It was a ball nearly as big as my fist, and, breaking in the extraction, discovered a plum-stone in the centre, which was its nucleus. Upon further examination, I found there was another, which I extracted entire nearly as large as the first. The patient recovered very fast, and in a month's time, was a hearty strong man." (*Cases in Surgery with remarks, &c.*)

The concretions, which form round fruit stones in the intestinal canal, may become so large as to be incapable of passing onward to the rectum, and, of course, occasion fatal complaints. The annexed case, recorded by Mr. Hey, furnishes us with a proof of this remark. "I was permitted (says this practical writer) to examine the body of a boy, whose parents lived at Holbeck, near Leeds, and who had died in an emaciated state, having had long continued pain in the abdomen, attended with frequent attacks of the ileus.

"I found lying in the transverse arch of the colon a concretion, which was become of so great bulk, that it could pass no farther along the course of the intestine. This seemed to have been the sole cause of the boy's death."—*Practical Observations in Surgery, p.* 492.

Sometimes, patients ultimately get well by voiding the concretions either by vomiting, or stool. Mr. Charles White gives us an account of some such instances; in one fourteen concretions on plum-stones were discharged from the anus; in another, twenty-one similar bodies were ejected from the stomach.

The latter gentleman concludes some interesting cases with warning practitioners, and mankind in general, of the great danger of swallowing fruit-stones, and he doubts not, that many persons have lost their lives from this cause, when the disorder has not been understood, but been mistaken for the cholic.

The reader may find the principal information on this subject, in *Cases in Surgery by Charles White, F. R. S.* 1770. *p.* 17. *Philos. Trans. abridged, Vol. V. p.* 256. *et seq. Edinburgh Med. Essays and Observ. Vol.* 1. *p.* 301. *Ibid. Vol.* 5. *p.* 431. *Essays Phys. and Literary, Vol. II. p.* 345. *Dr. Leigh's Natural History of Lancashire, Plate I. fig.* 4. *Practical Observations in Surgery, by W. Hey, F. R. S. p.* 490.

AMAURO'SIS, (from αμαυροω, to obscure). Frequently called, *Gutta Serena.* This is a disease of the eye, attended with a diminution, or total loss of sight, and arising from a paralytic affection of the retina and optic nerve.

The symptoms of amaurosis are noted for being extremely irregular, and the diagnosis of the disease is often much more difficult, than is commonly supposed, when there is no visible defect in the eye, and we have nothing more than the patient's assurance, that he has lost the faculty of seeing things. In many cases the pupil is very much dilated, immovable, and possesses its natural black colour, and usual transparency. It cannot be denied, that this is the state of numerous cases; but, it is equally true, that there are many exceptions. Sometimes, in the most complete and incurable cases, the pupil is of its proper size, and even capable of very free motion; and, occasionally, it is actually smaller and more contracted, than natural. We have the authority of Richter for asserting, that in particular instances, the iris not only possesses a power of motion, but is capable of moving with uncommon activity, so that, in a very moderate light, it will contract in an unusual degree, and nearly close the pupil. (*Anfangsgrunde der Wundarzneykunst, Band.*3, *p.*424, *Edit.*1795.)

Two or three remarkable instances of the active state of the iris, in cases of amaurosis, were some time ago shewn to me by Mr. Albert, surgeon of the York Hospital, Chelsea, and I have seen some other similar cases in St. Bartholemew's Hospital. The patients alluded to, had most of them not the least power of distinguishing the difference, between total darkness, and the vivid light of the sun, or a candle placed just before their eyes. Janin and Richter have seen the pupil capable of motion, in this disease, and Schmucker has twice seen the same fact.

From the various conditions of the pupil, in different cases of gutta serena, no conclusions, entitled to much confidence, can even be drawn, with regard to the particular nature and character of the complaint. For instance, the moveable or immovable state of the pupil can neither be considered, as a favourable, or unfavourable circumstance. Sometimes an amaurosis may be cured, which is attended with a pupil extraordinarily dilated, and entirely motionless. Sometimes, the disorder proves incurable, notwithstanding the pupil is of its proper size, and capable of motion. There are likewise examples, in which the pupil recovers its moveableness, in the course of the treatment, although nothing will succeed in re-establishing the sight. (*Richter, Op. cit. p.* 425.)

The pupil of an eye, affected with amaurosis, (says this experienced surgeon) seldom exhibits the clear shining blackness, which is seen in a healthy eye. In general it is of a dull, glossy, hornlike blackness, which symptom alone is frequently enough to apprise a well-informed practitioner of the nature of the disease. Sometimes the colour of the pupil has an inclination to green; while, in other examples, this aperture seems to be dense, white, and cloudy, so that the complaint might easily be mistaken for the beginning of a cataract. This error, into which inexperienced surgeons are liable to fall, may easily be avoided by attention to the following circumstances. The misty appearance is not situated close behind the pupil, in the place of the crystalline lens; but, frequently, is manifestly deeper in the eye. Nor is it in proportion to the impairment of sight, the patient being quite blind, while the misty appearance is so trivial, that, if it arose from the opacity of the crystalline lens, it could at most only occasion a slight weakness and obscurity in vision. It must be acknowledged, that it is more difficult to avoid mistake, when a beginning amaurosis is accompanied with this cloudiness in the eye, and, consequently, when the degree of blindness seems to bear some proportion to the degree of mistiness in the pupil. However, in this case, if we are to credit the observations of Rich-

ter, the true nature of the disease may generally be known, by considering, that though the patients sight is weak, it is not rendered faulty by an appearance of mist before the eyes, which latter circumstance is always complained of by persons, who are beginning to be afflicted with cataracts; not to mention, that there are usually present several other symptoms, which exclusively belong to the gutta serena.

Sometimes, the interior of the eye, a good way behind the pupil, seems quite white, and a concave light coloured surface may be observed, upon which the ramifications of blood-vessels can be plainly seen. In particular instances, this white surface extends over the whole back part of the eye; while, in other cases, it only occupies a half, or a small portion of it. This peculiar appearance has been ascribed to a loss of transparency in the retina itself, and a consequent reflection of the rays of light. (*Haller, Element. Physiol. Tom. 5, p.* 409.)

There can now be no doubt, that such whiteness behind the pupil must sometimes have originated from the diseased mass, which, in cases of fungus hæmatodes of the eye, grows from the deeper part of this organ, and gradually makes its way forward to the iris, being always attended with total loss of sight.

If we put out of consideration the impairment of vision, a degree of squinting is, according to Richter, the only one symptom, which is inseparable from amaurosis. An obliquity of sight, accompanying the imperfect state of the disease, has also been particularly adverted to by Mr. Hey, of Leeds. (*Med. Observations and Inquiries, Vol. 5*). The patient, says Richter, not only does not turn either eye towards any object, in such a manner, that the object looked at is in the axis of vision; but, he also does not turn both his eyes towards the same thing. This is alleged to be the only symptom, which we can trust, where implicit confidence should not be put in the mere assurance of the patient, that he cannot see, while all the coats and humours of the eye present their natural appearance. Provided this observation be correct, it must be highly interesting to the military surgeon, amaurosis being a common affliction of soldiers, many of whom, however, endeavour to avoid service by pretending to labour under a disease, which they well know does not necessarily produce any very considerable alteration in the natural appearance of the part affected.

The gutta serena originates with very various symptoms, and in exceedingly different ways. Richter thinks it probable, that this variety, attendant on the beginning of the disease, depends upon some difference in the cause of the complaint, and indicates the propriety of having variety in the modes of treatment. Sometimes, the patient loses his sight quite suddenly; while, in other instances, the power of seeing diminishes so slowly, that months, and even years elapse, before the disease attains the worst degree. Sometimes, the gutta serena commences with several symptoms, which seem to betray an increase of sensibility in the eye, or some irritation affecting this organ. In moderately light places, the patient can discern things very well; but, in a great light, he is not able to see at all. The eye is sometimes so sensible, that a strong light will make it weep and become painful. Patients of this description ought always to wear a shade, however bad their sight may be. Sometimes the gutta serena originates with symptoms of weakness and diminished irritability. The sight is cloudy, and the patient finds that he can see better in a light, than a dark situation. He feels as if some dirt, or dust, were upon his eyes, and is in the habit of frequently wiping them. His power of vision is greater after meals, than at the time of fasting. His sight is always, for a short time, plainer, after the external use of tonic remedies, such as hartshorn, cold water, &c. Richter informs us of a person, who was nearly quite blind, but, was constantly able to see very well, for the space of an hour, after drinking champagne wine. He also mentions a woman, who had entirely lost her sight, who was in the habit of having it restored again, for half an hour, whenever she walked a quick pace up and down her garden. This author likewise acquaints us with the case of a lady, who had been blind for years; but, experienced a short recovery of her sight, on having a tooth extracted.

Sometimes, as Richter observes, the symptoms appear to indicate a preternatural accumulation of the humours of the eye. The patients complain of a tension of the eye-ball, which is often particularly irksome and distressing. Whenever such sensation is experienced, the eyesight becomes weak; and, on the subsidence of this feeling, the patient is again able to see better. The eye-ball feels hard, and occasionally is more or less enlarged, so that the state of the affected organ somewhat resembles that, which takes place in hydrophthalmia. (See *this Word.*) When a cataract is complicated with a gutta serena, the vitreous humour is sometimes found, in operating for the first disease, to be preternaturally thin, the eye being, as it were, in a dropsical state. Sometimes, the blood-vessels of the conjunctiva are varicose; the patient sees black specks, net-like appearances, streaks, snake-like figures, &c. It seems as if, in this case, the blood-vessels of the retina and choroides were in the same varicose state, as those

of the conjunctiva, so as to make pressure upon the first of these membranes. That the vessels are in reality thus dilated, says Richter, is rendered probable by the bleeding, which is apt to occur in the eye in operating for cataracts, complicated with the gutta serena.

In particular examples, the eye seems to be under the influence of some peculiar irritation. The patients see several objects, which are in motion, and of different colours, more especially, shining, fiery spots, flames, and rays of light. Sometimes, amaurosis arises after violent inveterate ophthalmies, and headachs. Certain patients, before being attacked with the complaint, are repeatedly afflicted with catarrhs, which cease as soon as the gutta serena is formed. According to Richter, the mucous membrane of the nose then becomes unusually dry and free from secretion. Some patients, of this kind, have been known to regain their sight, for a short time, on a copious discharge of mucus spontaneously taking place from the nose. Paying diligent attention to these various circumstances, attending the origin of the disorder, says Richter, will often be of great assistance to the practitioner, in enabling him to select a judicious method of treatment, when all other indications are absent.

The disease commonly makes its attack upon both eyes at once, and even in those occasional instances, in which only one is deprived of sight, the other rarely continues for a long time sound. The disorder generally extends over the whole eye, but, sometimes only a half of the organ is affected, the case being then named *amaurosis dimidiata*. In the first example, the patient is quite blind; in the second, he can discern the half of objects. Sometimes the malady seems to be confined to a single little spot in the eye, in which case, the patient is conscious of having before the retina an immoveable black speck. It is to this particular instance, that some pathologists apply the term, *scotomia*. Also patients, who may be said to be entirely blind, sometimes have a small part of the retina, which is still susceptible of the impression of light, and is usually situated towards one side of the eye. (*Hey, in Med. Observations and Inquiries, Vol. 5.*) Richter mentions, that, in one man, who was, in other respects, entirely bereft of vision, this sensible point of the retina was situated obliquely over the nose, and so small, that it was always a considerable time, before its situation could be discovered: he adds, that it was so sensible, as not only to discern the light, but even the spire of a distant steeple. According to this author, it is the centre of the eye, that seems to be the first and most seriously affected in the gutta serena. Hence, the generality of patients, who have a beginning imperfect amaurosis, can always see objects, laterally situated, better than those, which are immediately before them.

The gutta serena is sometimes an intermittent disorder, making its appearance at regular or irregular intervals. In certain examples, as Richter remarks, the disease prevails at particular times, commonly all day, till a certain hour; or from one day till the next; or at a stated time every month. The attacks of the complaint sometimes take place at indeterminate periods. In particular cases, another morbid affection is associated with the impairment of sight. Richter mentions a man, who became blind at twelve o'clock in the day, when the upper eye-lid used also to hang down in consequence of being affected with paralysis. The attack always lasted twenty-four hours. On the following day, at twelve o'clock, the sight used to return, and the patient then suddenly regained the power of raising the upper eye-lid. He would continue thus able to see for the space of the next twenty-four hours. Whenever he took bark, the disease was regularly doubled; that is to say, the man then alternately remained blind forty-eight hours, and recovered the power of seeing for only twenty-four. In another patient, cited by this experienced surgical writer, the aqueous humour, during the blindness, always became discoloured whitish, and turbid; but, its transparency regularly returned on the cessation of the attack. According to Richter, the periodical amaurosis commonly depends upon irritation affecting the digestive organs, the stimulus of worms, or irregularity in the menstrual discharge. Sometimes, it is plainly a symptom of a confirmed ague, the patient being attacked with an ordinary intermittent, and blind during each paroxysm; but, always regaining his sight as soon as each fit is over. (See *Richter's Anfangsgrunde der Wundarzneykunst, Band* 3, *Kap.* 14.)

Before treating of the different causes of the gutta serena, it seems proper to describe the ordinary symptoms of the disease. When the patient is first attacked, his sight gradually grows weaker; he feels, as if a gauze, or cob-web, were drawn over his eyes, and imagines he sees a white surface, studded with black specks, which he endeavours to wipe away. By degrees, the pupil of the eye loses its brilliancy, and distends itself much beyond the natural size; and if the patient's eye be closed, the upper eye-lid gently rubbed, and then suddenly opened, in a light place, the pupil will contract very little, or not at all. The sight grows weaker and weaker; spectacles and convex glasses are of no service, and the patient, (generally speaking) sees worse in the open day-

light, than in a dark situation. While the patient is at all conscious of the impression of the rays of light, or while a certain power of seeing still continues, the disease is called the *imperfect*, or *incomplete amaurosis*; but, when the patient is wholly insensible of the stimulus of light, the disorder is termed *perfect*, or *complete*.

Schmucker remarks, that, although the *complete* gutta serena is generally a gradual disease, there are cases, in which it comes on quite suddenly, without being preceded by the above-mentioned circumstances. These cases, he says, have frequently fallen under his observation, and been more easy of cure, than when the affliction has taken place in a more gradual way. In such instances, the sight is totally lost, the patient can distinguish no object whatsoever, the pupil of the eye is uncommonly enlarged, and if the eyelid be shut, and then rubbed, and opened in a strong light, the aperture in the iris remains fixed, and incapable of contraction. A lighted candle may be held to the patient's eyes, without exciting sensation. The pupil now loses its shining black gloss, and grows pale, so that a skilful practitioner can perceive the difference, without being close to the patient. Persons, attacked in this manner, usually have an unhealthy and timid look. (See *Schmucker's Vermischte Chirurgische Schriften, Band* 2.)

According to Richter, the remote causes of gutta serena may be properly divided into three principal classes, the differences of which indicate three general methods of treatment.

It is alleged, that the first class of causes seem to depend upon an extraordinary plethora and turgidity of the blood-vessels of the brain, or of those of the optic nerves and retinæ, upon which last parts a degree of pressure is thereby supposed to be occasioned. A considerable plethora, especially, when the patient heats himself, or lets his head hang down, will frequently excite the appearance of black specks before the eyes, and sometimes complete blindness. A plethoric person (says Richter), who held his breath, and looked at a white wall, was conscious of discerning a kind of network, which alternately appeared and disappeared with the diastole and systole of the arteries. This phenomenon, it is conjectured, originated from the plethoric state of the vessels of the retina. Boerhaave mentions a man, who always lost his sight on getting tipsy, and regained it on becoming sober.

Richter thinks it likely, that it is in this manner, that the disease is produced, by the suppression of some habitual discharge of blood, by not being bled according to custom, by the stoppage of the menses, and by the cessation of hemorrhage from piles; circumstances, which, if we can give credit to all the accounts of Richter, Scarpa, Schmucker, and other experienced writers on the subject, frequently give rise to the gutta serena. In the same manner, the complaint may be brought on by great bodily exertions, which must determine a more rapid current of blood to the head. Richter informs us of a man, who became blind, all on a sudden, while carrying a heavy burden up stairs. He tells us of another man, who laboured excessively hard, for three days in succession, exerting his strength very much, and who became blind at the end of the third day. Pregnant women, in like manner, are sometimes bereft of their sight during the time of labour. Schmucker has recorded a remarkable instance of this in a strong young woman, thirty years old, and of a full habit. Whenever she was pregnant, she was troubled with violent sickness, till the time of delivery, so that nothing would stop in her stomach. She was bled, three or four times, without effect. Towards the ninth month, her sight grew weak, and for eight or ten days before parturition, she was quite blind. The pupil of the eye was greatly enlarged, but, retained its shining black appearance. She recovered her sight immediately after delivery, and did not suffer any particular complaints. Schmucker assures us, that he has been three times a witness of this extraordinary circumstance. (*Vermischte Chir. Schriften, Band* 2, *p.* 6, *edit.* 1786.) Richter speaks of a person, who lost his sight, during a violent fit of vomiting. Schmucker acquaints us, that it is not uncommon for soldiers, who are performing forced marches in hot weather, to become blind all on a sudden. All great exertions of strength, when the body is plethoric, or heated, or bent forwards with the head in a low posture, are usually attended with some danger of bringing on amaurosis.

The blindness, which follows external injuries of the head, is ranked by Richter among the preceding class of cases. A man, who received a smart box on the ear, says this author, lost his sight on the spot. Richter conceives it probable, that a concussion of the head may sometimes produce an atony of the blood-vessels, giving rise to their dilatation, and consequent pressure on the adjacent nerves: perhaps, it is more likely, that the blow itself actually ruptures them, and produces an effusion of blood. Richter suspects, that the gutta serena, which originates during a violent ophthalmy, or during a severe inflammatory fever, may be of the same nature. He thinks it probable, that persons, who become blind

while exposing themselves to the burning sun with their heads uncovered, have their sight impaired in a similar way.

The diagnosis of this first species of the gutta serena is founded on an acquaintance with the preceding remote causes, which are for the most part very evident, as the blindness, which is the consequence of them, follows with remarkable quickness.

The second class of causes are supposed to operate, by weakening either the whole body, or the eye alone, and they indicate the general, or topical use of tonic remedies. In the first case, the gutta serena appears as a symptom of considerable universal debility of the whole system; in the second case, the disease is altogether local. Every great general weakness of body, let it proceed from any cause whatsoever, may be followed by a loss of sight. The gutta serena, if we can give credit to the statement of Richter, has sometimes been the consequence of a tedious diarrhæa, a violent cholera morbus, profuse hemorrhage, and immoderate salivations. He informs us of a dropsical woman, who became blind, on the water being let out of her abdomen. According to the same author, no general weakening causes operate upon the eyes, and occasion total blindness, so powerfully and often, as premature and excessive indulgence in venereal pleasures.

The causes are various, which operate locally in weakening the eyes. Nothing has a greater tendancy to debilitate these organs, than keeping them fixed very attentively, for a long while, upon minute objects. But, however long and assiduously objects are viewed, if they are diversified, the eye suffers much less, than when they are all of the same kind. A frequent change, in the objects, which we look at, has a material effect in strengthening and refreshing the eye. The sight is particularly injured by looking at objects with only one eye at a time, as is done with telescopes and magnifying glasses; for when one eye remains shut, the pupil of that, which is open, always becomes dilated beyond its natural diameter, and lets an extraordinary quantity of light into the organ. The eye is generally very much hurt, by being employed in the close inspection of brilliant, light-coloured, shining objects. They are greatly mistaken, says Richter, who think, that they save their eyes, when they illuminate the object, which they wish to see, in the evening, with more lights, or with a lamp, that intercepts and collects all the rays of light, and reflects them upon the body, which is to be looked at. Richter makes mention of a man, who, in the middle of winter, went a journey on horseback, through a snowy country, while the sun was shining quite bright, and who was attacked with amaurosis. He speaks of another person, who lost his sight, in consequence of the chamber, in which he lay, being suddenly illuminated by a vivid flash of lightning. A man was one night siezed with blindness, while he had his eyes fixed on the moon in a fit of contemplation. Richter also expresses his belief, that a concussion of the head, from external violence, may sometimes operate directly on the nerves, so as to weaken and render them completely paralytic.

The third class of causes consist of irritations, which, in some inexplicable way, directly, or, probably, for the most part, directly, affect the optic nerves, and render them insensible of the impression of the light. Most of these irritations are asserted to lie in the abdominal viscera, whence they sympathetically operate upon the eyes. The observations of Richter, Scarpa, and Schmucker, all tend to confirm, that amaurosis more frequently arises from irritation in the gastric organs, than any other cause whatever. It may often be ascertained that patients with amaurosis have suffered much trouble, and long grief, or been agitated with repeated vexations, anger, and other passions, which are supposed to have a great effect in disordering the bilious secretion, and the digestive functions in general. Richter tells us of a man, who lost his sight, a few hours after being in a violent passion, and recovered it again the next day, upon taking an emetic, by which a considerable quantity of bile was evacuated. A woman is also cited, who became blind, whenever she was troubled with what are termed, acidities in the stomach. (See *Anfangsgrunde der Wundarzneykunst, Band* 3, *Kap.* 14.)

The continental surgeons are excessively comprehensive in their ideas of the causes of the gutta serena, and, with many truths, they blend an evident quantity of unestablished conjectures, and palpable absurdities. I believe, it will generally be found, that, when surgical writers assign a multitude of causes for any disease, they deal very much in mere supposition. It would be idle credulity, indeed, to put faith in the assertions concerning the amaurosis being occasioned by the bad treatment of particular fevers, suppressed diarrhœas, the repulsion of eruptive complaints, &c. There is no reason, why a person should not become blind about the time, when another disorder gives way; but, we ought to have some other ground for the doctrines, to which allusion is made, before we can presume to offer them as entitled to confidence.

Worms in the alimentary canal are alleged to be sometimes the cause of amaurosis, and, since a disordered state of the

gastric organs is universally acknowledged to be frequently concerned in the production of blindness, we can have no difficulty in conceiving, that worms may likewise have the same effect. Besides gastric irritations, there are some others, which class as causes of this disease. A violent fright, which is considered as being a frequent remote cause of the gutta serena, is supposed by Richter to operate chiefly by irritating the nerves.

The blindness sometimes proceeds from a mechanical kind of irritation. A man received in his right orbit a small shot, which pierced the upper eye-lid, and lodged at the upper part of the socket, between the eye-lid and eye-ball, so that it could be felt externally. Richter adds, that this patient shortly afterwards became blind in the left eye; but recovered his sight in it again, upon the excision of the shot. (*Anfansgr. der Wundarzn, Band* 3, *p.* 439.)

Sometimes, says this experienced surgeon, the irritation, exciting amaurosis, seems to have its seat in the mucous membrane of the nose and frontal sinuses. We have already adverted to the unusually dry state of the nostril, that has been suspected of being occasionally conducive to this species of blindness.

The gutta serena is generally difficult of cure. However the degree of difficulty in relieving the disease varies in different cases, according to the way in which the malady originates, and the nature of the cause.

Professor Scarpa, of Pavia, has given an excellent account of the prognosis in cases of amaurosis. Some of his doctrines, however, founded on the humoral pathology, are hypothetical and, consequently, are purposely omitted in the following account. It also deserves notice that the case supposed to originate from injury of the supra-orbitary nerve, is not always incurable, as the experience of Hey confirms. (See *Med. Obs. and Inq. Vol.* 5.)

Amaurosis is divided by Scarpa into the *perfect*, or *imperfect; inveterate*, or *recent;* and *continued*, or *periodical.*

The *perfect, inveterate amaurosis*, attended with organic injury of the substance, constituting the immediate organ of sight, says Scarpa, is a disease absolutely incurable. The *imperfect, recent amaurosis*, particularly that which is *periodical*, is commonly curable; for, it is mostly sympathetic with the state of the stomach and primæ viæ, or dependent on causes, which though they affect the immediate organ of sight, are capable of being dispersed, without leaving any vestige of impaired organization in the optic nerve, or retina.

When amaurosis has prevailed several years, in persons of advanced age, whose eyesight has been weak from their youth; when it has come on slowly, at first with a morbid irritability of the retina, and then with a gradual diminution of sense in this part, till total blindness was the consequence; when the pupil is motionless, not circular, and not much dilated; when it is widened in such a degree, that the iris seems as if it were wanting, and the margin of this opening is irregular and jagged; and, when the bottom of the eye, independently of any opacity of the crystalline lens, presents an unusual paleness, like that of horn, sometimes partaking of green, and reflected from the thickened retina, the disease may be generally set down as incurable. Cases may be deemed irremediable which are attended with pain all over the head, and a continual sensation of tightness in the eye-ball, which are preceded by a violent, protracted excitement of the nervous system, and then by general debility, and languor of the constitution, as after masturbation, premature venery, and hard drinking. There is no remedy for cases, connected with epileptic fits, or frequent spasmodic hemicrania; nor for such as are the consequence of violent, long-continued, internal ophthalmia. Cases are incurable, also, when produced by violent concussions of the head, direct blows on the globe of the eye, or a violent contusion, or other injury of the supra-orbitary nerve, and this, whether the disease take place immediately after the blow, or some weeks subsequently to the healing of the wound of the eye-brow. Amaurosis is also incurable, when occasioned by foreign bodies in the eye-ball, lues venerea, or exostoses about the orbit. Lastly, amaurosis is absolutely irremediable, when conjoined with a manifest change in the figure and dimensions of the eye-ball.

On the contrary, all cases of imperfect, recent amaurosis, whether the blindness be total, or partial, are mostly curable, when not produced by causes, capable of contusing or destroying the organic structure of the optic nerve, and retina. This is especially true, when the retina is in some degree sensible to the impression of light. Recent, sudden cases, in which the pupil is not excessively dilated, and its disk remains regular, while the bottom of the eye is of a deep black colour; cases, unaccompanied with any acute, continual pain in the head and eye-brow, or any sense of constriction in the globe of the eye itself; cases, which originate from violent anger, deep sorrow, fright, excessive fulness of the stomach, a foul state of this viscus, general plethora, or the same partial affection of the head, suppression of the menses, habitual bleedings from the nose, piles, &c. great loss of blood, nervous debility, not too inveterate, and in young subjects, are all, generally speak-

ing, curable. Amaurosis is also, for the most part, remediable, when produced by convulsions, or the efforts of difficult parturition; when it arises during the course, or towards the termination of acute, or intermittent fevers; and when periodical, coming on at intervals, such as every day, every three days, every month, &c.

Before entering into the consideration of the treatment of the gutta serena, I shall take this opportunity of noticing a few remarkable circumstances, which are connected with the disease.

It sometimes happens, that, when a patient shuts one eye, he can only half distinguish objects; but, that if he opens both eyes, he sees every thing in its natural form. In this case, according to Schmucker, one eye is sound, and only some fibres of the nerve of sight are injured in the other.

In the gutta serena, which comes on gradually, the patient also sometimes sees double, with both eyes. Some years ago, Schmucker cured a major of hussars, who saw the three lines of his squadron double; and the same surgeon was ordered by the king of Prussia to attend a gentleman, who was afflicted in a similar way. In the opinion of this eminent surgeon, such cases are brought on by a violent distention of the vessels of the choroides, where he thinks, that varices may easily arise, in consequence of the weak resistance of that membrane. In this manner, the filaments of the retina suffer pressure, and the rays of light are broken. Under these circumstances, if prompt assistance be not afforded, total and frequently incurable blindness may be the consequence. Schmucker met with an example of such an irremediable amaurosis, (the only instance in his practice), in a young man, twenty-six years of age. When the patient made application for the advice of the foregoing surgeon, he had been blind a year. Before he lost his sight, he remarked, that, after any violent emotion, his sight at first grew weak, and that objects afterwards appeared double. When his circulation was at all hurried, he saw black spots before his eyes, and, at length, was quite blind. The vessels of the choroides were as large, as if they had been injected with wax, and every kind of surgical assistance proved ineffectual.

I have already adverted to the occasional moveableness of the iris, notwithstanding the insensible state of the retina. Let me next take notice of a case, which sometimes presents itself, and is quite the reverse of this last. The nerves of the iris may be paralytic, while those of sight continue unimpaired. Schmucker tells us, he was acquainted with a woman, whose pupil was uncommonly distended, and totally incapable of motion. Her sight was very weak, and spectacles were of no use to her. She could scarcely discern any thing by day, or in a strong light; but, she could see rather better at night and in dark places. This infirmity of sight depended upon the dilated, paralytic state of the pupil, by which too many rays of light were admitted into the eye; and the reason, why the patient could see better at night, was, because the pupil, in its natural state, always becomes widened and dilated in a dark situation. (See *Vermischte Chirurgische Schriften, Von J. L. Schmucker, Band* 2, *p.* 13, 14.)

TREATMENT OF AMAUROSIS, OR THE GUTTA SERENA.

Here the first endeavour of the practitioner should be to find out and remove the cause of the disease. This is the surest and best way of proceeding; but, it is worthy of notice, that sight does not invariably return, although the real cause of the blindness has been radically removed. In such cases, the continuation of the loss of sight is ascribed to the torpor of the nerves, which have been for a considerable time without action, and have been impaired by the disease. The practitioner usually prescribes stimulants and tonics, with a view of bringing the nerves into their original state of activity. In other cases, sight returns as soon as the cause of the disease is removed. When it is found impossible to make out any thing, respecting the cause of the disorder; the surgeon should found the curative indications upon the symptoms and appearances, which have taken place in the origin and course of the disease, and from which symptoms some conjectures may be drawn, in regard to the nature of the case. When no appearances of this kind occur, and nothing can be learnt about the cause of the malady, the surgeon must have recourse to such empirical remedies, as extensive experience has shewn to be sometimes truly capable of removing the affection, although an explanation cannot always be given of the manner, in which they operate.

We shall follow Richter, and first treat of that method of cure, which is directed against the causes of the disease, and which, whenever circumstances will admit of its adoption, must be regarded as the most proper and scientific.

In that species of amaurosis, which arises from the first class of causes, namely, from those, which seem to induce the disease, by means of a preternatural fulness and dilatation of the blood vessels of the brain, or eye, the indication is evidently to lessen the quantity of blood, and diminish the determination of it to the head. For this purpose, the patient may be bled in the arm, temporal artery, or foot. This evacuation is to be repeated as often as seems necessary, and it will be better to

begin with taking away from twelve to sixteen ounces. We are also advised by Schmucker to apply ten or twelve leeches to the neck and temples. The efficacy of bleeding, in the cure of particular cases of the gutta serena, is strikingly exemplified by numerous well authenticated observations. Richter informs us of a woman, who, on leaving off having children, lost her sight; but, recovered it again by being only once bled in the foot. A spontaneous hemorrhage from the nose also cured a young woman, who had been blind for several weeks. (*Anfangsgrunde der Wundarzneykunst. Band* 3, *p.* 442.)

General bleeding sometimes proves ineffectual, unless assisted by topical. Leeches may be applied to the temples, or cupping glasses to the back part of the neck. When the disorder seems to be connected with an interruption of the menses, or the cessation of bleeding from piles, leeches may be put on the perinæum, the inside of the thigh, or the sacrum. Local bleeding, however, seldom avails, except the whole mass of blood has been previously diminished by a prudent employment of the lancet. Besides bleeding, the surgeon may advantageously have recourse to other means at the same time, as, for instance, emollient glysters, purgatives, blisters, bathing the feet in warm water, &c.

In some cases all the foregoing means fail in producing the desired benefit, even when they have been followed up, as far as the state of the pulse, and strength of the constitution will allow. Here the continuance of the disease may depend, either upon the stoppage of some wonted evacuation of blood, or else upon some other cause of the first class. In the first of these cases, (says Richter) experience shews, that the disease will sometimes not give way, before the accustomed discharge is re-established, on which the malady depends, notwithstanding evacuants may be employed in any way whatsoever. A woman, who (as this author acquaints us) had lost her sight, in consequence of a sudden suppression of the menses, did not recover it again till three months after the return of the menstrual discharge, notwithstanding every sort of evacuation was tried. He also tells us of another woman, who had been blind half a year, and did not menstruate, and to whose external parts of generation leeches were several times applied. As often as the leeches were put on, (says Richter) the menses in part recommenced; and, as long as they made their appearance, which was seldom above two hours, the woman always enjoyed a degree of vision. (*Anfangsgrunde der Wundarzneykunst, Band* 3, *p.* 443.)

For the amaurosis, arising from suppression of the menses, Scarpa recommends leeches to the labia pudendi, bathing the feet in warm water, and afterwards exhibiting an emetic, and the resolvent pills, of which I shall presently speak. If these means fail in establishing the menstrual discharge, he says, great confidence may be placed in a stream of electricity, conducted from the loins across the pelvis, in every direction, and thence repeatedly to the thighs and feet. He enjoins us not to despair at want of success at first, as the plan frequently succeeds, after a trial of several weeks.

For the amaurosis, proceeding from the stoppage of an habitual copious bleeding from piles, Scarpa recommends the application of leeches and fomentations to the hemorrhoidal veins, then giving the patient an emetic, and, afterwards the resolvent pills. (*Saggio di Osservazioni e d'esperienze sulle principali malattie degli occhi, cap.* 19.)

When the disease does not appear to originate from the stoppage of any natural or habitual discharge of blood, and does not yield to the evacuating plan, Richter thinks, that the surgeon is justified in concluding, that the preternaturally dilated vessels have not regained their proper tone and diameter, and that he ought to employ topical corroborant remedies, particularly, cold water. Richter, in this kind of case, is an advocate for washing and bathing the whole head with cold water, especially, the part about the eyes; a method, he says, which may often be practised, after evacuations, with singular and remarkable efficacy.

When the return of sight cannot be brought about in this manner, Richter advises us to try such means, as seem calculated to stimulate the nerves, and remove the torpid affection of the optic nerves in particular. Of these last remedies, says he, emetics are the principal and most effectual. Soldiers, who lose their sight in performing forced marches, in hot weather, very commonly have it re-established again, by being immediately bled, and taking an emetic the next day. (See *Schmucker's Chirurgisch Wahrnehmungen* I. *Theil.*)

We come now to the consideration of that species of the gutta serena, which is regarded as the effect of some unnatural irritation. Here, according to the precepts delivered by Richter, we should endeavour to discover what the particular irritation is, and then endeavour to effect its removal. When it cannot be exactly detected, we are recommended generally to employ such remedies, as will lessen the sensibility of the nerves, and render them less apt to be affected by the irritation, of whatever kind it may be.

Sometimes the irritation is both discoverable and removable, and still the ef-

fect, that is to say, the blindness continues. In this circumstance, Richter thinks, that the surgeon should endeavour to obviate the impression, which the irritation has left upon the nerves, by the use of anodynes, or, else, he is of opinion, that the practitioner should try to remove the torpor of the nerves by the employment of stimulants.

But, according to Schmucker, Richter, and Scarpa, the curable imperfect amaurosis commonly depends on some disease, or irritation, existing in the gastric system, and, in some instances, complicated with general nervous debility, in which the eyes participate. Hence, the chief indication, in the majority of cases, is to free the stomach and primæ viæ from all irritating matter, to strengthen the gastric organs, promote digestion, and reanimate the nervous system in general, and the nerves of the eye in particular.

Emetics and internal resolvents answer the first purpose, and tartar emetic should be preferred to every pharmaceutical preparation. When afterwards administered, in small repeated doses, it also acts as a resolvent remedy, which operation may be rendered stronger by joining it with gummy saponaceous substances.

Dissolve three grains of the antimonium tartarizatum, for an adult, in six ounces of water, and give a spoonful of this solution, every half hour, until nausea and copious vomiting are produced. The next day exhibit some resolvent powders, consisting of an ounce of cream of tartar, and one grain of tartar emetic, divided into six equal parts. The patient must take one of these in the morning, another four hours afterwards, and a third in the evening, for eight or ten days in succession. This remedy will create a little nausea, a few more alvine evacuations, than usual, and, perhaps, in the course of a few days, vomiting. If the patient, during the use of these resolvent powders, should make vain efforts to vomit, complain of bitterness in his mouth, loss of appetite, and no renovation of sight, the emetic, as at first directed, is to be prescribed again. This is to be repeated a third, and fourth time, should the morbid state of the gastric system, the bitter taste in the mouth, the tension of the hypochondria, the acid eructations, and the inclination to vomit, make it necessary. The first emetic often produces only an evacuation of an aqueous fluid, blended with a little mucus; but, if it be repeated, a few days after the resolvent powders have been administered, it then occasions a discharge of a considerable quantity of a yellow, greenish, matter, to the infinite relief of the stomach, head, and eyes.

The stomach having been thus emptied, Schmucker's, or Richter's, resolvent pills are to be ordered.

These are composed as follows:

℞ Gum. Sagapen.
Galban. } an. ʒj
Sap. Venet.
Rhei optim. ʒiss
Tart. Emet. gr. xvi.
Suc. liquerit ʒj fiant pilulæ gran. quinque.

Three of these pills to be taken every morning and evening for a month, or six weeks.

℞ Gum. Ammoniac.
Ass. fœtid.
Sap. Venet. } an. ʒij
Rad. Valer. s. p.
Summit. Arnicæ.
Tart. Emet. gr. xviij. fiant pilulæ gran. quinque.

Six to be taken thrice a day for several weeks.

The pills are here directed to be made larger, than Schmucker and Richter order, that the number in one dose may be diminished. To prescribe 15 pills three times a day would seem absurd to the generality of patients in this country.

The following are the usual effects. The patient, after having vomited copiously, experiences a general calm, and an easiness not felt before. Sometimes, he begins to distinguish the outlines of objects the very day on which he takes the emetic; at other times, he does not reap this benefit till the fifth, seventh, or tenth day; and, in some instances, not before some weeks have elapsed, after the exhibition of the emetic, and the uninterrupted use of the resolvent powders and pills. When the patient begins to recover his sight, the dilated state of the pupil diminishes; the iris contracts more on being exposed to the vivid light of a candle; and, in proportion as the power of seeing things increases, the contraction and moveableness of the pupil augments. On the whole, the cure is very seldom completed in less than a month, during which time the employment of such remedies, as are calculated to revive the languid action of the nerves of the eye, must not be neglected.

When the above plan has rectified the state of the stomach, and partly effected the restoration of sight, such remedies must be employed, as strengthen the digestive organs, and excite the vigour of the nervous system in general, and of the nerves of the eye in particular. A powder is to be prescribed, composed of an ounce of bark, and half an ounce of valerian, divided into six equal parts, one of which is to be taken in the morning, and another in the evening, in any convenient vehicle, for, at least, five, or six weeks. During this time, the patient's nourishment must

consist of tender succulent meat, and wholesome broths, with a moderate quantity of wine, and proper exercise in a salubrious air. To excite the action of the nerves of the eye, the vapour of the aqua ammoniæ puræ, properly directed against the eye, is of the greatest service. This remedy is applied by holding a small vessel, containing it, sufficiently near the eye to make this organ feel a smarting, occasioned by the very penetrating vapours, with which it is enveloped, and which cause a copious secretion of tears, and a redness, in less than half an hour after the beginning of the applications. It is now proper to stop, and repeat the application, three or four hours afterwards. The plan must be thus followed up till the incomplete amaurosis is quite cured. The ammoniacal vapours should be used as soon as the stomach has been freed from all irritating matter, and they should not be discontinued, till long after the eye has been cured.

The operation of these vapours may be aided by other external stimulants, applied to such other parts of the body, as have a great deal of sympathy with the eyes. Of this kind, are blisters to the nape of the neck; friction on the eye-brow with the anodyne liquor; the irritation of the nerves of the nostrils by sternutative powders, like that composed of two grains of turbith mineral, and a scruple of powdered betony leaves; and, lastly, a stream of electricity. The latter has been proposed, as one of the principle means of curing amaurosis; but, experience has shewn, that electricity only merits confidence, as a secondary remedy, and Mr. Hey, one of its most zealous advocates, confesses, that it only succeeds in cases of recent amaurosis, and, usually, not in these, unless it be combined with proper internal medicines, among which resolvents are the chief. (*Med. Obs. and Inq. Vol.* 5, *p.* 26.)

Many might suppose bark to be a specific for the imperfect periodical amaurosis. This, however, is not the case. Bark, which is efficacious in intermittent fevers, and other periodical diseases, far from curing the periodical amaurosis, seems to exasperate it, rendering its return more frequent, and of longer duration, than before. On the other hand, this disease is most commonly cured, in a very short time, by exhibiting first emetics, then internal resolvents, and lastly, corroborants, and even bark, which was before useless and hurtful.

The above plan of curing the recent imperfect amaurosis succeeds in the majority of cases, when the disease is only sympathetic, or dependent on the morbid state of the gastric system. But, there are cases, in the formation of which many other causes operate, besides the most frequent one already stated. These demand the employment of particular curative means, in addition to those which have been already described. Such is, for example, the imperfect amaurosis, which occurs suddenly, in consequence of the body being excessively heated, or exposure to the sun, or violent anger, in plethoric subjects. This case requires, in particular, general and topical evacuations of blood, and the application of cold washes to the eyes and whole head. An emetic should next be given, and afterwards a purge of the kali tartarisatum, or small repeated doses of the tartar emetic. Schmucker relates, that, by means of bleeding and an emetic, he has oftentimes restored the eye-sight of soldiers, who had lost it in making forced marches, with very heavy burdens. In amaurosis, suddenly occasioned by violent anger, an emetic is the more strongly indicated after bleeding, as the blindness, thus arising, is always attended with a bitter taste in the mouth, tension of the hypochondria, and continual nausea. Richter gives an account of a clergyman, who became completely blind, after being in a furious passion, and whose eye-sight was restored the very next day, by means of an emetic, which was given with a view of relieving some obvious marks of bilious disorder in the stomach.

The treatment of the imperfect amaurosis, from fevers badly treated, deep sorrow, great loss of blood, intense study, and forced exertions of the eyes on very minute, or brilliant objects, consists also in removing all irritation from the stomach, and afterwards strengthening the nervous system in general, and the nerves of the eye in particular. In the case originating from fevers, the emetic and resolvent pills are to be given; then bark, steel medicines, and bitters; while the vapours of the aqua ammoniæ puræ are applied to the eye itself.

When the disorder seems to proceed from grief, or fright, the stomach and intestines are to be emptied by means of tartar emetic, and the resolvent pills; and the cure is to be completed by giving bark and valerian together; by applying the vapour of the aqua ammoniæ puræ to the eye; ordering nourishing easily digestible food; diverting the patient's mind, and fixing it on agreeable objects, and recommending moderate exercise. The amaurosis from fright is said to require a longer perseverance in such a plan, than the case from sorrow. (*Scarpa's Observat. Cap.* 19.)

The third species of gutta serena, or that which arises from debilitating causes, is of two kinds; in one, the disease is the consequence of a general weakness of the body; in the other, it is the effect of a debility, which is confined to the eye itself,

and does not extend to the whole constitution.

According to Scarpa, the incomplete amaurosis from general nervous debility, copious hemorrhage, convulsions ab inanitione, and long continued intense study, especially, by candle light, is less a case of real amaurosis, than a weakness of sight from a fatigued state of the nerves, especially of those constituting the immediate organ of sight. When this complaint is recent, in a young subject, it may be cured, or diminished by emptying the alimentary canal with small repeated doses of rhubarb, and then giving tonic cordial remedies. At the same time, the patient must abstain from every thing, that has a tendency to weaken the nervous system, and, consequently, the eye-sight. After emptying the stomach, prescribe the decoction of bark with valerian, or the infusion of quassia, with the addition of a few drops of the æther vitriolicum to each dose, with nourishing, easily digestible food. The aromatic spirituous vapours (mentioned in the article *Ophthalmy*) may then be topically applied; or if these should prove ineffectual, the vapour of the aqua ammoniæ puræ. The patient must take exercise on foot, horseback, or in a carriage, in a wholesome, dry air, in warm weather, and take advantage of sea bathing. He must avoid all thoughts of care, and refrain from fixing his eyes on minute shining objects. In proportion as the energy of the nervous system returns, and the constitution is strengthened, the sight is restored. In order to preserve, and improve this useful sense, the patient must adopt, above all things, every measure, calculated to maintain the tone of the stomach, and moderate the impression of light on the retina. This object can easily be attained by always wearing flat green glasses before the eyes, in a vivid light. (*Saggio di Osservaz. Cap.* 19.)

When the weakness is confined to the eye alone, Richter thinks the topical employment of corroborant applications alone necessary. Bathing the eye with cold water, says he, is one of the most powerful means of strengthening the eye. The patient should dip in cold water a compress, doubled into eight folds, and sufficiently large to cover the whole face and forehead, and this he should keep applied, as long as it continues cold. Or, else, he should frequently apply cold water to his eyes and face with his hand, on a piece of rag. In these cases, Richter does not approve of employing eye-glasses; he objects to their smallness, from which the eye soon makes the fluid warm, or presses the greater part of it out.

The eye may also be remarkably strengthened by repeatedly applying blisters of a semi-lunar shape above the eye-brows, only allowing the plaster, however, to remain just long enough to excite redness. Richter likewise speaks favourably of rubbing the upper eyelid, several times a day, with a mixture of the tinctura cantharidum, and spiritus serpilli, great care being taken, that none of the application come into contact with the eye itself. All spirituous and aromatic remedies are also proper. The infusum valerianæ et salviæ, with a proportion of camphorated spirit, and the oleum cajeput, are likewise enumerated, as useful and efficacious liniments. (*Anfangsgrunde der Wunderzneykunst, Band* 3, *p.* 452.)

When no probable cause whatsoever can be assigned for the disease, the surgeon is justified in employing such remedies, as have been proved by experience to be sometimes capable of relieving the affection, although upon what principle is utterly unknown. The chief means of this kind are emetics, given in small doses, so as to excite nausea, and occasionally in larger ones to occasion vomiting. A simple solution of two grains of the antimonium tartarizatum in a few ounces of water, taken by spoonfuls, frequently proves productive of remarkable benefit. Experience is also highly in favour of giving a trial to Schmucker's pills, the composition of which has been already described. The operation of these pills may be greatly assisted with the exhibition of arnica and valerian, sixteen grains of which should be taken every morning and evening, and the dose be gradually increased. The leaves and flowers of arnica, in an infusion, or else in powder, have been found efficacious. Of the last, at first ten grains, afterwards gradually increased to half a dram, may be prescribed every two, or every four hours.

Mercury also deserves trial, and its administration may be pushed till the patient begins to be salivated. This mineral may be tried either alone, or in conjunction with other medicines, as sarsaparilla, cicuta, or sulphur auratum antimonii.

Valerian alone, in the form of powder, and in the dose of half a dram, two or three times a day, may also be tried. Or this medicine may be joined with the decoction of bark, containing either some of the ammonia præparata, or a proper proportion of the spiritus ætheris vitriolici compositus. Stork has recommended pulsatilla, in the form of an extract, of which from half a grain to two grains is to be taken with sugar, or antimonial wine; or else an infusion of this plant may be given. The extractum hyoscyami albi is said to be often serviceable, either alone, in the dose of from two to eight grains, or together with antimonial wine. A sort of tincture of millepedes is among the empirical remedies in repute on the conti-

vent. Hemlock is another celebrated remedy. So is the powder of belladonna, given in the dose of five grains a day. The ammonia præparata, in the dose of a scruple, once a day, is likewise praised. Externally, the aqua ammoniæ acetatæ, mixed with sage, or setwell tea, has been spoken favourably of, as a collyrium. A mixture of oleum castorei and hartshorn, in equal parts, may be taken inwardly, in the dose of forty drops, and also rubbed upon the upper eyelid and eyebrow. Warner exhibited the oleum animale and musk.

The application of sternutative powders to the nostrils, is, perhaps, to be regarded as a mode of treatment, established on empirical principles, unless, indeed, we can place confidence in the statement of Schmucker and Richter, that an unusual dryness of the mucous membrane of the nose, following tedious and severe catarrhs, may have the effect of inducing amaurosis. The snuff, employed by Schmucker, is thus composed: ℞ Mercur. viv. ʒj. Sacchar. alb. ʒiij, Lill. Alb. Rad. Valerian. ā ā ʒj. Misce.

Mr. Ware has written in favor of the efficacy of electricity and a mercurial snuff in cases of gutta serena. The snuff is compounded of ten grains of turbith mineral (*hydrargyrus sulphuratus*) well mixed, with about a dram of the pulvis sternutatorium, glycirrhiza, or common sugar. A small pinch of this snuff, taken up the nose, is found to stimulate it very considerably—sometimes exciting sneezing, but, in general producing a very large discharge of mucus.

Mr. Ware has observed, that the pupil has been generally dilated, in the cases benefited by electricity. He notices, however, that there are many instances in which a contraction of the pupil is the only change, which takes place, in the appearance of the eye. In this sort of case, the impairment of sight is usually preceded by severe pain, and the original cause may be an internal ophthalmy of long continuance. The crystalline is sometimes visibly opaque. Here electricity has been found useful; but, Mr. Ware states, that, in these instances, the sublimate has proved superiorly and more certainly efficacious, and, consequently, he prefers it to all external applications whatever. He recommends 1-fourth of a grain, as a quantity proper for a common dose, and says, that it agrees best with the stomach when first dissolved, as Van Swieten directs, in half an ounce of brandy, and taken in a basin of sago or gruel. For young patients the dose must be diminished in proportion to their youth. The medicine is to be continued, as uninterruptedly as the constitution will allow, for a month, six weeks, or even longer.

Electricity is said to have proved more strikingly useful, in cases of amaurosis, originating from lightning, than when the disease has arisen from any other cause. Mr. Ware relates a very interesting instance of the success of electricity, in a case, which came on very suddenly, after great pain in the teeth, and a swelling of the face, had gone off. The disorder came on more suddenly; the temporary blindness was more entire; the eye-lids were more affected, and the cure more speedy, than in the instances related by Mr. Hey in the 5th vol. of the Med. Obs. and Inq. (*Chirurgical Observations relative to the Eye, by James Ware, Vol.* 1.)

With the exception of one case related by Valsalva, Scarpa was unacquainted with any instance of amaurosis, arising from a wound of the eye-brow, that was relieved, and he has therefore, set down this species as incurable. The opinion, however, is not perhaps correct, for, the first case related by Mr. Hey arose from this cause, and was cured by giving every night the following dose: ℞ *Calomel.* pp. *Camphor* ā ā iij. *Conserv. Cynosb.* q. s. *probe misceant et f. Bolus*, in conjunction with electricity. The lady, however, had been previously bled twice, had taken some nervous medicines, and had had a blister between the shoulders. The patient was first set upon a stool with glass feet, and had sparks drawn from the eyes, and parts surrounding the orbits, especially, where the superciliary, and infra orbitary branches of the fifth pair of nerves spread themselves. After this operation had been continued half an hour, she was made to receive, for an equal time, slight shocks through the affected parts. In a few days sight began to return, and in less than three months it was quite restored.—In another case, one grain of calomel, and two of camphor, given every night, and the employment of electricity, effected a cure. The disease had come on gradually, without any previous accident, or pains in the head. The patient a boy nine years old.

There are several other very interesting cases of amaurosis related by Mr. Hey, all of which make electricity appear a most efficacious remedy, though it is true, as Scarpa observes, that, in most of these instances, internal medicines, were also given, and bleeding occasionally practised. Mr. Hey attributes the benefit chiefly to the electricity, because, in two of his cases, no medicines were used, yet the progress of the amendment seemed to be as speedy in them, as in the rest, and in two instances, a degree of sight was obtained by the first application of electricity.

Mr. Hey makes particular mention of an obliquity of sight, as invariably attendant on amaurosis. It was most remarkable

in those, who had totally lost the sight of either eye, for, in them, the most oblique rays of light seemed to make the first sensible impression upon the retina; and in proportion as that nervous coat regained its sensibility, the sight became more direct and natural. (*Med. Obs. and Inq. Vol.* 5.)

Many of the causes of amaurosis are of such a nature, as to render the disease totally incurable. Bonetus, in his *Sepulchretum Anatomicum, lib.* 1. *sect.* 18. has given us several such cases: after death, the blindness in one was found to be occasioned by an encysted tumour weighing fourteen drams, situated in the substance of the cerebrum, and pressing on the optic nerves near their origin. In a second, the blindness was produced by a cyst, containing water, and lodged on the optic nerves, where they unite In a third, it arose from a caries of the os frontis, and a consequent alteration in the figure of the optic foramina. In a fourth, the cause of the disease was, a malformation of the optic nerves themselves. In some of the instances, in which no apparent alteration can be discovered in the optic nerve, Mr. Ware conjectures, whether a dilatation of the anterior portion of the circulus arteriosus may not be a cause of the affection. The circulus arteriosus is an arterial circle, surrounding the sella turcica, formed by the carotid arteries on each side, branches passing from them to meet each other before, and other branches passing backwards, to meet branches from the basilary artery behind. The anterior part of the circulus arteriosus lies directly over, crosses, and is in contact, with the optic nerves, just in the same way as the anterior branches lie over the optic nerves, the posterior ones lie over the nervi motores oculorum. Hence Mr. Ware attempts to refer the amaurosis itself, and the paralytic affection of the eye-lids, and muscles of the eye, sometimes attendant on the complaint, to a dilatation of the anterior and posterior branches of the circulus arteriosus. Dr. Baillie has noticed, in his Morbid Anatomy, the frequently diseased state of the trunk, or the small branches of the carotid arteries at the side of the sella turcica, and he says the same sort of diseased structure is also found in the basilary artery and its branches.

The most valuable information, concerning amaurosis, is to be met with in *Vermischte Chirurgische Schriften von J. L. Schmucker. Band* 2. *Berlin. Edit.* 2. 1786. *Remarks on Ophthalmy, &c. by James Ware. Inquiry into the causes preventing success in the extraction of the Cataract, &c. by the same. Osservazioni sulle Malattie degli Occhi di A. Scarpa. Venez.* 1802. *Hey's Practical Observations in Surgery. Medical Observations and Inquiries, Vol.* 5. *Schmucker's Wahrnehmungen. Richter's Anfangsgrunde der Wundarzneykunst. Band* 3. *Warner's Description of the Human Eye, &c. Chandler's Treatise of the Diseases of the Eye, chap.* 24. *Some scattered remarks in the posthumous work on the diseases of the eye of the late J. C. Saunders, &c.*

Some observations, connected with the subject of *Amaurosis*, will be found in the articles *Cataract*, *Hemeralopia*, *Hemiopia*, and *Nyctalopia*.

AMBE. (αμβη, the edge of a rock, from αμβαινω, to ascend.) An old chirurgical machine for reducing dislocations of the shoulder, and so called, because its extremity, projects, like the prominence of a rock. Its invention is imputed to Hippocrates. The ambe is the most ancient mechanical contrivance for the above purpose; but, is not at present employed. Indeed, it is scarcely to be met with in the richest cabinets of surgical apparatus. It is composed of a piece of wood, rising vertically from a pedestal, which is fixed. With the vertical piece is articulated after the manner of a hinge, an horizontal piece, with a gutter formed in it, in which the luxated limb is laid, and secured with leather strings. The patient places himself on one side of the machine; his arm is extended in the gutter, and secured; the angle, formed by the union of the ascending piece, and by the horizontal branch, is lodged in the armpit, and then the horizontal branch is depressed. In this way extension is made, whilst the vertical part makes counter extension, and its superior part tends to force the head of the humerus into its cavity. But, there is nothing to fix the scapula, and the compression made by the superior portion of the vertical piece of the machine, tends to force the head of the humerus into its cavity, before it is disengaged by the extension. (*Boyer on Diseases of the Bones, Vol. II.*)

AMBLYO'GMOS, or AMBLYO'SMOS, (from αμβλυς, dull.) A dimness of sight.

AMBLYOPIA, (from αμβλυς, dull, and ωψ, the eye.) Hippocrates means by this word, in his Aph. 31. Sect. 3. the dimness of sight, to which old people are subject. Paulus, Actuarius, and the best modern writers, seem to think, that amblyopia means the same thing as the incomplete amaurosis. (*Encyclopédie Méthodique; Partie Chirurgicale; Art. Amblyopie.*)

A'MMA. (from απτω, to bind.) A truss, or kind of bandage, or machine, for preventing a protrusion of the bowels in cases of hernia.

AMMONIÆ MURIAS, AMMONIA MURIATA, or *Sal Ammoniac.* Its chief use in surgery is as an external discutient application. See *Lotio Ammon. Muriatæ cum Aceto.*

Mr. Justamond recommends the following application for the cure of milk abscesses: ℞ Ammoniæ Muriatæ ℥j. Spi-

ritus Roris marini lbj. Misce. Linen rags are to be wet with the remedy, and kept continually applied to the part affected.

AMPHISMILA. (from αμφι, on each side, and σμιλη, an incision knife.) A double-edged scalpel.

AMPUTATION. (from *amputo*, to cut off.) This term signifies the operation of cutting off a limb, or other part of the body, as the breast, penis, &c.

Such an operation frequently becomes indispensably proper, on the principle of sacrificing a branch, as it were, for the sake of taking the only rational chance of saving the trunk itself.

The amputation of the large limbs, was anciently practised under many disadvantages. The ignorance of the old surgeons, in regard to the method of stopping hemorrhage, made many patients die, who had courage to submit to the operation. These practitioners were unacquainted with the mode of healing the wound by the first intention; and their instruments were as awkward and clumsy, as their dressings were irritating and improper.

The best modern practitioners have materially simplified all operations. This object has been greatly promoted, by diminishing the number, and improving the construction of instruments, and by abandoning the use of a multitude of external applications, most of which were useless, or hurtful.

But, much improved as amputation has been, no one can dissemble, that it is an operation at once terrible to bear, dreadful to behold, dangerous in its consequences, and leaves the patient for ever afterwards in a mutilated state. Hence it is the surgeon's duty never to have recourse to so severe a proceeding, without a perfect and well-grounded conviction of the necessity for so doing.

Though we seldom see the operation adroitly executed, its performance is by no means difficult, and the reason of the knife being so badly handled in this part of surgery, may generally be imputed to carelessness, slovenly habits, and fear and confusion on the part of the operator. There are several egregious faults in the method of amputating, which even many hospital surgeons in this metropolis are guilty of; but these we shall find, when we criticise them, are, for the most part, very avoidable, without any particular share of unusual dexterity. The real difficulty is to ascertain with precision the cases which demand the operation; those in which it may be dispensed with, and to know the exact periods at which it should be practised. These are considerations requiring the most profound attention, and the brightest talents. "The most expert operator (as Mr. O'Halloran observes) may not always be the best surgeon. To do justice to the sick and ourselves, we must, in many cases, rather avoid than perform capital operations. As to amputation itself, that its indiscriminate use, or, indeed, rather abuse, has been of infinitely greater detriment to mankind, than service, must be admitted. We daily hear of *sudden* accidents, that require amputation; and nothing is more common, than to be informed, that the patient died, in two or three hours after the operation. In sea engagements, where a limb is torn and shattered, death very soon follows mutilation; and, after battles, the recoveries bear no proportion to the deaths on this account.

"It was this great propensity to lopping off limbs, that caused a complaint to be exhibited to Louis the 14th, that his surgeons estimated the importance of their service by the number of mutilations only; and they were obliged to defend themselves from this aspersion before a prince, who wisely rated the lives of his subjects too high to suffer characters to be gained at their expence. In fact, it is not enough for a surgeon to know *how* to operate; he must also know *when* to do it." (See *O'Halloran's Treatise on Gangrene and Sphacelus: preface.*)

For such reasons, we shall first take a view of the circumstances, under which, the best modern surgeons deem amputation necessary. However, it may be proper to observe, that, in each of the articles, relative to the particular diseases and injuries, which ever render amputation indispensable, additional information will be offered.

1. *Compound Fractures.*

In a compound fracture the necessity for amputation is not always proportioned to the seriousness of the accident, but, also, frequently depends on other circumstances. For example, in the field and on board of ship, it is not always in the surgeon's power to pay such assiduous attention as the cases demand, nor to procure for the patient the proper degree of rest and stillness. In the field there is frequently a necessity for transporting the wounded from one place to another. In these circumstances it is proper to have immediate recourse to amputation, in all recent cases of bad compound fractures, the appearances of which are such as necessarily excite apprehension of the consequences. Doubtless, there are many cases, in which it would not be proper to adopt this practice, even under the most unfavourable circumstances of the above description. So, when a compound fracture occurs, in which the soft parts have not been considerably injured; in which the bones have been broken in such a direction that they can be easily set, and

kept in their proper position, and in which there is only one bone broken, amputation would be unnecessary and cruel. But, when the limb has been considerably injured, and the bones have been so broken that they cannot be kept in a proper position, after being reduced, we may make it a general rule to amputate, under the circumstances above alluded to.

The bad air in hospitals and large cities, which is always so detrimental to wounds, is another consideration which may render amputation advisable.

But, if in camps, on board of ship, in large cities, and hospitals, it is prudent for the surgeon to conform to the above rule, it is not so in other situations. When the patient can be put in a commodious place, whence it will not be necessary to remove him; when he can be left perfectly quiet, with good air and the aid of skilful surgeons; there are not many cases in which patients enjoying all these advantages, must of necessity submit to amputation. However, if the bones, muscles, and other soft parts, should be so bruised and mangled, that there is no hope of the limb ever being able to perform its functions again, we should not hesitate about performing amputation. An injury, which would, by its inevitable consequences, put the patient's life into the most imminent peril, may often be converted by amputation into one of the most simple nature, and easy of cure. (*Encyclopédie Méthodique, Partie Chirurgicale, Art. Amputation.*)

In compound fractures there are three points of time in which amputation may become proper. The first of these is immediately, or as soon as may be after the receipt of the injury. The second is, when the bones continue for a great length of time without any disposition to unite, and the discharge from the wound has been so long, and is so large, that the patient's strength fails, and general symptoms foreboding dissolution come on. The third is, when a mortification has taken such complete possession of the soft parts of the inferior portion of the limb, quite down to the bone, that upon the separation of such parts, the bone or bones shall be left bare in the interspace.

The first and second of these are matters of very serious consideration. The third hardly requires any.

When a compound fracture is caused by the passage of a very heavy body over a limb; such, for instance, as the broad wheel of a waggon, or loaded cart, or by the fall of a very ponderous body on it, or by a cannon shot, or by any other means so violent as to break the bones into many fragments, and so to tear, bruise, and wound, the soft parts, that there shall be good reason to fear, that there will not be vessels sufficient to carry on the circulation with the parts below the fracture, it becomes a matter of the most serious consideration, whether an attempt to save such a limb, will not occasion loss of life. This consideration must be before any degree of inflammation has seized the part, and, therefore, must be immediately after the accident. When inflammation, irritation, and tension have taken place, and when a disposition to gangrene in the limb, has begun to exert its pernicious influence, it is too late; an operation, then, instead of being beneficial, would prove destructive.

The necessity of immediate or very early decision, in this case, makes this a very delicate part of practice; for, however pressing the case may seem to the surgeon, it will not, in general appear in the same light to the patient, to the relations, or to bye-standers. They will be inclined to regard the proposition as arising from ignorance, or an inclination to save trouble, or a desire to operate; and it will often require more firmness on the part of the practitioner, and more resignation and confidence on the part of the patient, than is generally met with, to submit to such a severe operation, in such a seeming hurry, and upon so little apparent deliberation; and yet it often happens, that the suffering this point of time to pass, decides the patient's fate.

This necessity of early decision arises from the quick tendency to mortification, which ensues in the injured limb, and too often ends in the patient's death. That this is no exaggeration, melancholy and frequent experience evinces, even in those whose constitutions previous to the accident, were in good order; but much more in those, who have been heated by violent exercise, or labour, or liquor, or who have led very debauched and intemperate lives, or who have habits naturally inflammable and irritable. This is often the case when the fracture happens to the middle part of the bones, but is much more likely to happen, when any of the large joints are concerned. In many of these cases, a determination for or against amputation, is really a determination for or against the patient's existence.

That it would have been impossible to have saved some limbs, which have been cut off, no man will pretend to say; but, this does not render the practice injudicious. Do not the majority of those who get into the above hazardous condition, and on whom amputation is not performed, perish, in consequence of their wounds? Have not many lives been preserved by amputation, which, from the same circumstances, would otherwise most probably have been lost?

Pressing and urgent as the state of a compound fracture may be, at this first

point of time, still it will be a matter of choice, whether the limb shall be removed or not; but, at the second period, the operation must be submitted to, or the patient must die.

The most unpromising appearances at first, do not necessarily, or constantly end unfortunately. Sometimes, after the most threatening first symptoms, after considerable length of time, great discharges of matter, and large exfoliations of bone, success shall ultimately be obtained, and the patient shall recover his health and the use of his limb.

But sometimes, after the most judicious treatment through every stage of the disease; after the united efforts of physic and surgery, the sore, instead of granulating kindly, and contracting daily to a smaller size, shall remain as large as at first, with a tawny, spongy surface, discharging a large quantity of thin sanies, instead of a small one of good matter; the fractured ends of the bones, instead of tending to exfoliate, or to unite, will remain as perfectly loose and disunited as at first, while the patient shall lose his sleep, his appetite, and his strength; a hectic fever, with a quick, small, hard pulse, profuse sweats, and colliquative purging, contributing at the same time to bring him to the brink of the grave, notwithstanding every kind of assistance, in these circumstances, if amputation be not performed, what else can rescue the patient from destruction?

The third and last period is a matter which does not require much consideration. Too often the inflammation consequent upon the injury, instead of producing abscess and suppuration, tends to gangrene and mortification, the progress of which is often so rapid, as to destroy the patient in a very short space of time, constituting that very sort of case, in which amputation should have been immediately performed. But, sometimes even this dreadful malady is, by the help of art, put a stop to, but not until it has totally destroyed all the surrounding muscles, tendons, and membranes, quite down to the bone, which, upon the separation of the mortified parts, is left quite bare, and all circulation between the parts above and those below, is by this totally cut off. In this instance, whether the surgeon saw through the bare bone, or leave the separation to be effected by nature, the patient must lose his limb. (*See Pott on Amputation.*)

There is yet another circumstance which may render amputation necessary, in cases of compound fractures, and this is, when such copious hemorrhages occur, as cannot be stopped by any other means. These bleedings proceed from arteries which have been lacerated by the ends of the broken bone, or some other cause, at the moment of the accident. (*Encyclopédie Méthodique; Partie Chirurgicale, Tom.* 1, *p.* 80.)

2. *Extensive contused and lacerated Wounds.*

These form the second class of general cases requiring amputation. Wounds without fracture, are not often so bad as to require this operation. When a limb, however, has been contused and lacerated, in such a degree, that all its principal blood vessels are injured, and there is no hope of a continuance of the circulation, the immediate removal of the member should be recommended, whether the bones be injured or not. Also, since no effort on the part of the surgeon can preserve a limb so injured, and such wounds are more likely to mortify than any others, the sooner the operation is undertaken the better.

In these cases, as in those of compound fractures, though amputation may not be necessary at first, it may become so afterwards. The foregoing observations, relative to the second period of compound fractures, are equally applicable to wounds, unattended with injury of the bones. Sometimes hemorrhages occur, which we cannot restrain; or a rapid mortification comes on; or such a copious suppuration, as the system cannot bear any longer. (*Encyclopédie Méthodique; Partie Chirurgicale, Tom.* 1, *p.* 80, 81.)

3. *Cases in which Part of a Limb has been carried away by a Cannon Ball.*

When part of a limb has been torn off by a cannon ball, or any other cause capable of producing a similar effect, the end of the stump from which the part has been separated, should be removed with a cutting instrument.

This is an instance in which many surgeons dispute the necessity of amputation. They urge as a reason, that the limb being already removed, it is better to endeavour to cure the wound as speedily as possible, than to increase the patient's sufferings and danger, by making him submit to amputation. It must be remembered, however, that the bones are generally shattered, and reduced into numerous fragments; the muscles and tendons are unequally divided, and their ends torn and contused. All allow it is absolutely necessary to extract the splinters of bone, and cut away the irregular extremities of the tendons and muscles, which operations would require a longer time than amputation itself. Besides, we should recollect, that by making the incision above the injured part, so as to be enabled to cover the bone with flesh and integuments, perfectly free from injury, the extent of the wound is so diminished, that the healing can be accomplished in one third of the time which would otherwise be requisite. A much firmer cicatrix is also thus obtained. Such reflections must convince us, that amputation here holds forth very great advantages. It cannot increase the patient's danger, and, as for the momentary augmentation of pain, which he

suffers, he is amply compensated by all the benefits resulting from the operation. (*Encyclopédie Méthodique; Partie Chirurgicale, Tom.* 1, *p.* 81.) See *Gun-shot Wounds.*

4. *Mortification.*

Mortification is another cause, which, when advanced to a certain degree, renders amputation indispensably proper. We have noticed, that bad compound fractures, and wounds, often terminate in the death of the injured limb. Such surgeons as, at all events, have been determined to oppose the performance of amputation, have pretended that this operation is totally useless in the present instance. They assert, that when the mortification is only in a slight degree, it may be cured, and that when it has advanced to a considerable extent, the patient will perish, whether amputation be performed or not. But this way of viewing things is so contrary to facts, and the experience of every impartial practitioner, that we shall make no attempt to refute the assertions. Though we allow that it would be very bad practice, every time the slightest appearance of gangrene occurred; yet, when the mischief has increased in such a degree, that all, or the greater portion of the soft parts are gangrenous, as is too frequently the case, there exists no remedy for this state; or, at least, none with which we are acquainted, and amputation is absolutely necessary.

Practitioners have entertained very opposite opinions, concerning the period when one should operate in cases of mortification. Some pretend, that whenever the disorder presents itself, and especially when it is the effect of external violence, we should amputate immediately the mortification has decidedly begun to form, and while the mischief is in a spreading state. Others believe, that the operation should never be undertaken, before the progress of the disorder has stopped, even not till the dead parts have begun to separate from the living ones.

The advocates for the speedy performance of amputation, declare that the further progress of the mortification may be stopped, and the life of the patient preserved, by cutting above the parts affected. Experience, however, has shewn such practice to be highly dangerous, and not deserving of confidence. Whatever pains may be taken in the operation, only to divide sound parts, there is no certainty of succeeding in this object, and the most skilful practitioner may be deceived. The skin may appear to be perfectly sound and free from inflammation, while the muscles which it covers, and the parts immediately surrounding the bone, may actually be in a gangrenous state. But, even when the soft parts are found free from apparent distemper, on making the incision, still, if the operator should not have waited till the mortification has ceased to spread, the stump will almost always be attacked by gangrene. Surgeons, who have had opportunities of frequently seeing wounds which have a tendency to mortify, entertain the latter opinion. Such was the sentiment of Pott, who says, that he has often seen the experiment made, of amputating a limb in which gangrene had begun to shew itself, but never saw it succeed, and it invariably hastened the patient's death.

The operation may be postponed, however, too long. Mr. Samuel Sharp, in particular, recommended too much delay, advising the operation never to be done till the natural separation of the mortified parts had considerably advanced. Mr. Sharp was a surgeon of immense experience, and his authority carries with it the greatest weight. But, perhaps, he was too zealous in his opposition to a practice, the peril of which he had so often beheld. When the mortification has ceased spreading, there is no occasion for further delay. We now obtain, just as certainly, all the benefits of the operation, and get rid of a mass of putridity, the presence of which may become highly pernicious, should the absorbents take up any of the matter into the circulation. However, this danger would not be so considerable as that which would arise from too precipitate an operation; and it is better to defer amputation a little more than is absolutely requisite, than to run any risk of doing it, before being certain that the parts have lost their tendency to gangrene.

Whatever may be the particular cause of the mortification, it makes no alteration in the above doctrines: the practice should always be the same. Though it has been thought that a distinction should be made, between cases in which mortification is the effect of an internal cause, and those in which it is the consequence of an external one; yet, no practical advantage can be deduced from this discrimination. In no cases ought the operation to be performed before the period above specified, and in all it may be undertaken, as soon as there is a positive cessation in the progress of the disorder. (*Encyclopédie Méthodique: Partie Chirurgicale, p.* 81, 82.) See *Mortification.*

5. *White-Swellings.*

Scrofulous joints, with diseased bones, and distempered ligaments, is another case, in which amputation may become absolutely necessary. There is one circumstance attending this complaint which often renders it particularly unpleasant, which is, that the subjects are most frequently young children so as to be incapable of determining for themselves, which inflicts a very distressing task on their nearest relations.

All the efforts of physic and surgery often prove absolutely ineffectual, not only to cure, but even to retard this most terrible malady. Notwithstanding many cases admit of cure, there are numerous others which do not so. The disease often begins in the very inmost recesses of the cellular texture of the heads of the bones, forming the large articulations, such as the hip, knee, ankle, and elbow; the bones become diseased in a manner, which we shall explain in the article (*Articulation*), sometimes with great pain and symptomatic fever; sometimes with very little of either, at least in the beginning. The cartilages covering the ends of these bones, and designed for the mobility of the joints, are totally destroyed; the epiphises in young subjects are either partially, or totally, separated from the said bones; the ligaments of the joints are so thickened, and spoiled by the distemper, as to lose all natural appearance, and become quite unfit for all the purposes for which they were intended: the parts appointed for the secretion of the synovia, become distempered in like manner; all these together furnish a large quantity of stinking sanious matter, which is discharged either through artificial openings, made for the purpose, or through small ulcerated ones. These openings commonly lead to bones which are diseased through their whole texture. When the disease has got into this state, the constant pain, irritation, and discharge, bring on hectic symptoms of the most destructive kind, such as total loss of appetite, rest, and strength, profuse night sweats, and as profuse purgings, which foil all the efforts of medicine, and bring the patient to the brink of destruction.

It is an incontestible truth, that unless amputation be performed, a patient thus situated must perish; and it is equally true, that numbers, in the same circumstances, have, by submitting to the operation, recovered vigorous health. (See *Pott on Amputation.*)

It is a fact highly important to be known, that, in these cases, amputation is attended with more success, when performed late, than when undertaken at an early period, before the disease has made great advances. This is particularly fortunate, as it affords time for employing such remedies as are at all likely to check the progress of the disorder. (*Encyclopédie Méthodique, Tom.* 1, *p.* 83.) See *Joints—White-swelling.*

6. *Exostoses.*

We shall here content ourselves with merely mentioning, that this disease may render amputation necessary, when it is impracticable to remove the bony swelling in the manner we shall explain in the article *Exostosis*, and the tumour becomes hurtful to the health, or insupportable, on account of its weight, or other circumstances.

7. *Caries and Necrosis.*

Another distemper, productive of the necessity of amputation, is a caries of a whole bone or bones, forming a limb. A caries is here meant, not merely possessing the surface of such bones, but the whole internal substance, and that from end to end. Bones become carious from a variety of causes, such as struma, lues venerea, deep-seated abscesses, pressure, &c.; and such carious bones, properly treated, often exfoliate and cast off their dead parts. But, when the whole substance of the bone becomes diseased, from end to end, no means will avail. The use of the scalper, the raspatory, and the rugine, for the removal of the diseased surface of bones; of the trephine, for perforating into the internal texture of carious bones, and of exfoliating applications, will not succeed, and, unless the whole bone be removed by amputation, the patient will die. Mr. Pott's refutation of Mr. Bilguer, who asserts that amputation is not requisite in these instances, is a masterly and most convincing production.

Admitting, that internal and external remedies may so alter and correct even the carious part of a bone, as to render it capable of parting with the rest, and becoming sound, yet occasionally there is not time for such experiments, and even in very young subjects, the whole habit is, by the rotten bone so poisoned and spoiled, that the worst kind of hectic fever will ensue, in spite of bark, and every other specific, in spite of drying, burning, rasping, and boring, and, in a very short space of time, destroy the patient, unless restored by amputation. (See *Caries and Necrosis.*) (*Pott on Amputation.*)

8. *Cancerous and other inveterate Diseases, such as the Fungus Hæmatodes.*

Cancerous, inveterate diseases, and ulcers on limbs, sometimes render amputation a matter of necessity. In treating of cancer, we shall remark, that little or no confidence should be placed either in internal or any kind of topical remedies, and that there is nothing, except the total separation of the part affected, upon which any rational hopes of cure can be built. Cancer is not frequently seen in the extremities. Every man of experience, however, must occasionally have seen, in this situation, if not actually cancer, diseases quite as intractable, and which cannot be cured except by removing the affected part. This may often be accomplished without cutting off the whole limb. But, when the disease has spread beyond certain bounds, amputation, above the part affected, is the only thing to which re-

course can be had with any hope of success. Sometimes even amputation itself cannot effect a cure, when the operation has been delayed too long. It has succeeded, however, when the disease had reappeared, after a cure had been seemingly achieved by the excision of the diseased parts.

Besides cancerous, there are other ulcers, which may render amputation indispensable. Thus, when an extensive ulcer, of any sort whatsoever, is evidently impairing the health; when, instead of yielding to remedies, it becomes larger and more inveterate; when, in short, it puts life in imminent danger; amputation should be advised. For further information refer to *Cancer, Fungus Hæmatodes, &c.*

9. *Various Tumours.*

That there are numerous swellings, which destroy the texture of the limbs, render such members useless, afflict the patient with dreadful sufferings, and bring him into the most debilitated state, no man of observation can fail to have seen. When such tumours can neither be discussed, nor cut out with safety, amputation of the limb is the only resource.

Mr. Pott has particularly described a tumour affecting the leg, for which the operation is sometimes requisite. It has its seat in the middle of the calf of the leg, or rather more towards its upper part, under the gastrocnemius and soleus muscles. It begins by a small, hard, deep-seated swelling, sometimes very painful, sometimes but little so, and only hindering the patient's exercises. It does not alter the natural colour of the skin, at least until it has attained a considerable size. It enlarges gradually, does not soften as it enlarges, but continues through the greatest part of it incompressibly hard, and, when it is got to a large size, it seems to contain a fluid, which may be felt towards the bottom, or resting, as it were, on the back part of the bones. If an opening be made for the discharge of this fluid, it must be made very deep, and through a strangely distempered mass. This fluid is generally small in quantity, and consists of a sanies mixed with grumous blood: the discharge of it produces very little diminution of the tumour, and very high symptoms of irritation and inflammation come on, and advancing with great rapidity, and most exquisite pain, very soon destroy the patient, either by the fever, which is high, and unremitting, or by a mortification of the whole leg. If amputation has not been performed, and the patient dies, after the tumour has been freely opened, the mortified and putrid state of the parts, prevents all satisfactory examination; but, if the limb was removed, without any previous operation, and (which Mr. Pott, in his experience, found to be the only way of preserving the patient's life) the posterior tibial artery, will be found to be enlarged, distempered, and burst; the muscles of the calf to have been converted into a strangely morbid mass; and the posterior part of both the tibia and fibula more or less carious. (*Pott on Amputation.*)

It seems only necessary to adduce another species of tumour to illustrate the necessity of amputation. The following case is related by Mr. Abernethy. A woman was admitted into St. Bartholomew's Hospital with a hard tumour in the ham. It was about four inches in length, and three in breadth. She had also a tumour in front of the thigh, a little above the patella, of lesser size and hardness. The tumour in the ham, by its pressure on the nerves and vessels, had greatly benumbed the sensibility, and obstructed the circulation of the leg, so that the limb was very odematous. As it appeared impossible to remove this tumour, and as its origin and connexions were unknown, amputation was resolved on. On examining the amputated limb, the tumour in the ham, could only be divided with a saw. Several slices were taken out of it by this means, and appeared to consist of a coagulable and vascular substance, in the interstices of which a great deal of bony matter was deposited. The remainder of the tumour was macerated, and dried, and it appeared to be formed of an irregular and compact deposition of the earth of bone. The tumour on the front of the thigh, was of the same nature as that of the ham, but containing so little lime, that it could be cut with a knife. The thigh bone was not at all diseased, which is mentioned, because when bony matter is deposited in a limb, it generally arises from the disease of a bone. (*Surgical Observations*, 1804.)

Before the late facts and improvements, relative to the treatment of aneurisms, these cases, on the extremities, were generally set down as requiring amputation. Even Mr. Pott wrote in recommendation of such practice, and his observations on this subject are among the few parts of his writings, which the enlargement of surgical knowledge, since his time, has rendered objectionable.

We shall conclude these remarks on the causes requiring amputation, with advising surgeons never to undertake this serious operation, without consulting the opinions of other professional men, when their advice can be obtained.

General Remarks on Amputation.

Although, from the earliest period of human existence, there must have been oc-

casion for performing this operation, we have no decisive proofs from history, that it was ever done by the father of medicine, Hippocrates. A. C. Celsus, who lived in the reign of Tiberius, and whose book, de Re Medica, should be ready by every surgeon, has left us a short description of the mode of amputating gangrenous limbs. It has been often remarked, that Celsus has left no instructions for securing the divided blood-vessels; but, it has not been commonly noticed, that, in his chapter on wounds, he directs us to stop hemorrhages by taking hold of the vessels, then tying them in two places, and dividing the intermediate portion. If this measure cannot be adopted, he advises the use of a cauterizing iron. Several hints are to be met with in the writings of Celsus, from which it may be inferred, that the ligature of bleeding vessels was sometimes practised in that early age; and this supposition is strengthened, by a fragment of Archigenes, preserved by Cochius, on the subject of amputation, where he speaks of tying or sewing the blood-vessels. We are not, however, in possession of all the writings of medical authors, prior to the time of Galen, and must therefore remain in doubt upon this point. (*Rees's Cyclopædia, Art. Amputation.*)

The author of the article, referred to, therefore, argues with some appearance of reason, that if amputation often proved fatal in the days of Celsus, "sæpe in ipso opere," as the expression is, it was owing to the want of some efficacious method of compressing the blood-vessels, during the operation itself; for, although the ligature might, perhaps, be employed, they knew not the use of the tourniquet.

But, admitting, that the ancients were not altogether ignorant of the plan of tying arteries, it cannot be credited, that they adopted the practice to any extent, for if they had, they would not have continued so partial to the cautery, boiling oils, and a farrago of astringent applications. Ambrose Paré, therefore, seems to me to deserve as much praise for the introduction of the ligature into common use, as if no allusions to this method whatsoever had existed in the writings of Celsus and other ancients.

Before the invention of the tourniquet, the operation was attended with so much danger, that very few surgeons ventured to undertake it, and even since the above instrument became known, a long time elapsed before one half of the patients were saved, on whom amputation had been executed. At present, perhaps, not more than one individual out of twenty loses his life after the operation, even taking into the account all those on whom it is practised in hospitals. In private practice, where one can pay greater attention to various important circumstances, which relate to amputation, the proportion of deaths must be still less.

The different parts of the operation, which deserve particular attention, are, the choice of the place where to amputate; the measures for guarding against bleeding during the operation; the division of the integuments, muscles, and bones, which is to be accomplished in such a manner, as to be able afterwards to cover the whole surface of the stump with skin; tying the arteries, which should be done without including the nerves, or any other adjacent part; placing the integuments in a proper position after the operation; and, finally, the subsequent treatment of the wound.

The ancients contented themselves, before making the incision, to have the skin forcibly drawn upward by an assistant; they next divided, by one sweep of the knife, the integuments and flesh down to the bone, and, afterwards, sawed the bone on a level with the soft parts, which were drawn upward. It appears, however, that the views of Celsus extended further than those of most of his cotemporaries, and followers, even almost down to modern times. After cutting the muscles down to the bone, he says, that the flesh should be reflected, and detached underneath with a scalpel, in order to denude a portion of the bone, which is then to be sawn as near as possible to the healthy flesh, which remains adherent. He states that, when this plan is pursued, the skin around the wound will be so loose, that it can almost be made to cover the extremity of the bone. It is to be lamented, that this advice, inculcated by Celsus, should not have been comprehended, or that it should have been so neglected, as to stand in need, as it were, of a new discoverer, and that a suggestion of such importance should have remained so long useless. But, the fact is, hemorrhage formerly rendered amputation so dangerous, that the ancient surgeons could not devote much attention to any thing else in the operation, and practitioners amputated so seldom, that we read in Albucasis, that he positively refused to cut off a person's hand, lest a fatal hemorrhage should ensue, and the patient did it himself and recovered.

Ambrose Paré, a French surgeon, who flourished in the 16th century, and to whom we have already alluded, made some important innovations, with regard to the operation of amputation. It is to his industry, good sense and skill, that we are chiefly indebted for the abolition of cauterising instruments, and the general use of a needle and ligature to suppress the bleeding, after the removal of a limb.

An anonymous writer has given the following account of the practice and opinions of this distinguished surgeon, in relation to amputation. "Paré recommended to cut off the whole of the gangrenous part, if the limb be mortified; but, to encroach as little as possible upon the living flesh. At the same time, he laid it down as a rule, not to leave a very long stump to an amputated leg; because the patient could more conveniently make use of a wooden leg, with the stump only five finger breadths long, below the knee, than if much more of the flesh were to be preserved. In the arm, however, he left the whole of the living and healthy portion of the member, only separating the diseased part from the sound.

"In preparing for amputation, he directs the skin and muscles to be drawn upwards, and bound tight with a broad bandage, a little above the part, where the incision is to be made. This fillet was intended to answer a threefold purpose: 1st, to afford a quantity of flesh for covering the bone, and facilitating the cure. 2dly, To close the extremities of the divided blood-vessels. 3dly, To dull the patient's feelings, by pressure on the subjacent nerves. When this firm ligature has been applied, Paré directs an incision to be made down to the bone, either with a common large scalpel, or a curved knife. Then, with a smaller curved knife, we are carefully to divide the muscle, or ligament, remaining between the bones of the fore-arm, or leg; after which, we may proceed to saw off the bone as high as possible, and to remove the asperities, occasioned by the saw.

"With the assistance of a curved pair of forceps, he drew out the extremities of the bleeding arteries, either by themselves alone, or with some portion of the surrounding flesh, to be firmly tied with a strong double thread. He now loosened his bandage, brought together the lips of the wound over the face of the stump, and kept them as close as he could, without actual stretching, by means of four stitches, or sutures. If the larger tied vessels should accidentally become loose, he desires the ligature, or bandage, to be again passed round the limb; or, else, what is better, to let an assistant gripe the limb firm with both hands, and press with his fingers over the course of the bleeding vessel, so as to stop the hemorrhage; then, with a square edged needle, about four inches long, and a thread, four times doubled, the surgeon must secure the artery in the following manner. Thrust the armed needle into the outside of the flesh, half a finger's breadth from the vessel, which bleeds, and bring it out at the same distance from the bleeding orifice; then surround the vessel with the ligature, pass it back again to within one finger's breadth of the place, where it first entered, and tie a fast knot upon a folded slip of linen rag, to prevent its hurting the flesh. By this means, says Paré, the orifice of the artery will be agglutinated to the adjoining flesh so firmly, as not to yield one drop of blood: but, if the hemorrhage were not considerable, he contented himself with the application of astringent powders, &c.

"Thus did this famous surgeon endeavour, by his single example and precepts, to exclude the barbarous use of hot irons in amputation. He says, he knew not of any such practice among the old surgeons; except that Galen recommended us to tie bleeding vessels, towards their origin, in accidental wounds; and he thought proper to do the same in cases of amputation. But, in an apology, at the end of his book, Paré has quoted, in his own defence, a dozen authors, who employed, or recommended the ligature before him; and he might have cited many more.

"From the statement, we have here given, it may be seen, how far our best writers, of every country almost have erred in ascribing the original invention of tying arteries to Ambrose Paré. Great merit, indeed, was due to him, for the part he took in extending, and even reviving this incomparable practice; nay, it is not certain, whether any one before him had ever applied the needle and ligature in similar cases, i. e. after amputation: but, how very wide of the truth, Mr. John Bell's recent account of this matter is, will appear to every person, who will enquire into the facts themselves; for, not only were ligatures and needles in use, among the ancients; but, likewise the tenaculum, or hook to lay hold of the bleeding vessels, when they had buried themselves in the muscles. We refer our inquisitive readers to Avicenna, Ætius, Albucasis, Brunus, Theodoric, Guido di Cauliaco, John de Vigo, Bertapalia, Tagaultius, Petrus Argillata, Andreas a Cruce, &c. &c. where they will find enough to satisfy them on this head." (*Rees's Cyclopædia art. Amputation.*) See also the article *Hemorrhage*, in this Dictionary.

As Paré, however, like the rest of the old surgeons, used to cut directly down to the bone, many of the stumps, which he made, must have been badly covered with flesh, and ill fitted for bearing pressure. But, all that I have read on the subject of amputation impresses me with a strong conviction, that, in former times, the projection of the end of the bone, the sugar loaf form of the stump, the frequent exfoliations, and the difficulty in healing the part, and keeping it healed, were more

owing to the rude way of dressing the stump, and ignorance how the right method of promot ng union by the first intention, than the method of operating, or any other circumstance.

Cheselden is regarded as the surgeon, who revived Celsus's method, in proposing to divide the soft parts *by a double incision*, that is by cutting the skin and cellular substances first, and then, by dividing the muscles, down to the bone, on a level with the edge of the skin. In this manner the bone could be sawn higher up, and its end could be more completely covered with skin. The wound, however, always continued very large, so that after the amputation of a thigh, three, four, and often five or six months, elapsed before the stump was healed. After all, this had a disadvantageous form, being commonly pyramidal, by reason of the projection of the bone beyond the soft parts. A new ulcer was also frequently produced, by an exfoliation of this part of the bone, long after the patient had been deemed quite cured.

To hinder the stump from assuming this pyramidal, or sugar-loaf shape, a circular bandage was employed, which acted by supporting the skin and muscles, and preventing their retraction. This bandage, when properly applied, from the upper part of the limb downward, fulfilled in a certain measure the end proposed, but, never answered well enough to make the wound heal in a reasonable time. Mr. Sharp proposed bringing the edges of the skin together with sutures; but, the pain and other inconveniencies of this method were such, that it was never extensively adopted, and Mr. Sharp himself ultimately abandoned it. It is to be regretted, that a very excellent modern surgeon, Mr. Hey, should have spoken rather in favour of the use of sutures, in bringing together the edges of the wound after amputation. (*Practical Observations in Surgery, p. 534, Edit. 2.*)

It appears, from the above account, that our ancestors failed in their endeavours to amputate, so as to shorten the time required for healing the wound, and give the stump a flat, smooth surface. Hence, several surgeons, about forty years ago, endeavoured to revive the method of amputating with a flap, which was practised above a century ago by Lowdham, an Englishman, and was afterwards brought into notice again, at different periods by M. M. Verduin, Sabourin, Vermale, and La Faye. The plan consisted in preserving a large portion of the muscles and integuments, below the place, where the division of the bone was made, in order to put this flap over the stump, and retain it in this position by a suitable mode of dressing, until an union was accomplished. The operation will be explained hereafter.

The most zealous hopes were always placed in this method, which, to the advantage of defending the end of the stump by a sort of thick fleshy cushion, added that of covering it with perfectly sound skin. But, notwithstanding the exertion of many able men to bring the flap operation to perfection, it has always sunk into disuse. Some surgeons of the present day, however, have not been deterred from further trials to improve the method, while others have endeavoured to perfect the method of amputating with a circular incision. The labours of both the former and latter have not been useless, and, in both ways, by covering the stump with sound skin, the part has often been healed by the first intention, except just where the ligatures of the vessels were situated.

MR. ALANSON'S MODE OF AMPUTATING.

This gentleman begins his *Practical Observations on Amputation*, with exposing, how useless and inconvenient it was to apply a circular band round the limb, with a view of directing the track of the knife, and giving steadiness to the parts, as was commonly done, before his publication issued from the press.

As soon as the tourniquet is applied, let an assistant grasp the limb circularly with both hands, and firmly draw the skin and muscles upward. The operator must then fix his eye upon the proper part, where he is to begin his operation, and he will now make the circular incision through the skin, and adipose membrane, with considerable facility and dispatch, as the knife will pass much quicker, in consequence of the tense state in which the parts are supported. The operator not being confined to cut in the exact line of the tape, he can also execute this part of the operation, in half the time, which is required in the mode usually practised. The division of the skin being the most painful part of incisions in general, it should always be done as quickly as possible. By drawing up, and supporting the skin and muscles, as here directed, we more fully attain the grand object of preserving as much skin and muscular substance, as will afterwards form a good cushion upon the extremity of the bone.

After the incision, through the integuments, let the assistant still continue a steady support of the parts, then separate the cellular and ligamentous attachments with the point of your knife, till as much skin is drawn up, as will with the united assistance of the particular division of the muscles hereafter recommended, fully cover the whole surface of the wound.

Although a speedy cure may be produced, by covering the wound with skin and adipose membrane only, yet the after consequences are of very material import-

ance in the thigh amputation, and hence the following mode deserves attention, as the parts thus divided, form a thicker cushion over the bone, are much better adapted to immediate contact, union, and the formation of a stump with a regular surface. Hence, after the advised separation of the cellular and ligamentous attachments to the necessary extent, instead of applying the knife close to the edge of the integuments, and dividing the muscles in a circular perpendicular manner down to the bone, proceed as follows. We will suppose you are operating upon the thigh, and standing on the outside of the limb. Apply the edge of your knife, under the edge of the supported integuments, upon the inner edge of the vastus internus muscle, and cut obliquely through that and the adjacent muscles, upwards as to the limb, and down to the bone, so as to lay it bare, about three or four finger's breadth higher, than is usually done, by the common perpendicular circular incision. Now draw the knife towards you, then its point rests upon the bone, and keeping the edge in the same oblique line, already pointed out by the former incision, the rest of the muscles are to be divided in that direction all round the limb, the point of the knife being in contact with, and revolving round the bone through the whole of the division.

The speedy execution of the above directed incision, will be much expedited, by one assistant continuing a firm and steady elevation of the parts, and another attending to preserve the skin from being wounded, as the knife goes through the muscles, at the under part of the limb. Many practitioners next proceed to deprive the bone of its periosteum to a considerable extent, above and below the part, where the saw is to pass, and this they do so minutely, as to consume a considerable time in its execution. This step not only creates unnecessary delay, but, as the periosteum serves to support the vessels in their passage to the bone, is also apt to produce exfoliations, above the part where the bone is to be divided with the saw. Instead of this practice, first apply the retractor, as advised by Gooch and Bromfield, then denude the bone at the part, where you intend the saw to pass, and you will now saw it off higher than is usually practised, which is a material object in preventing a projection of the bone, and forming a small cicatrix.

A stump, formed in the thigh, agreeably to the foregoing plan, (if you bring the parts gently forward after the operation, and then view the surface of the wound,) may be said to resemble, in some degree, a conical cavity, the apex of which is the extremity of the bone: and the parts thus divided, are obviously the best calculated to prevent a sugar-loaf stump.

The part, where the bone is to be laid bare, whether two, three, or four fingers breadth higher than the edge of the retracted integuments; or, in other words, the quantity of muscular substance to be taken out, in making the double incision, must be regulated by considering the length of the limb, and the quantity of skin that has been previously saved by dividing the membranous attachments. The quantity of skin saved, and muscular substance taken out, must be in such an exact proportion to each other, as that by a removal of both, the whole surface of the wound will afterwards be easily covered, and the limb not more shortened, than is necessary to obtain this end.

After the removal of the limb, let each bleeding artery be gently drawn out with the tenaculum, and tied with a common slender ligature, as naked as possible. When the large vessels are tied, the tourniquet should immediately be slackened, and the wound well cleaned, to detect any vessel, that might otherwise lie concealed with its orifice blocked up by coagulated blood; and before the wound is dressed, its whole surface should be examined with the greatest accuracy, by which Mr. Alanson has frequently observed a pulsation, where no hemorrhage previously appeared, and turned out a small clot of blood from within the orifice of a considerable artery. Particular attention, is well bestowed in making every vessel secure, that is likely to bleed on the attack of the symptomatic fever; for besides the fatigue and pain, to which such an accident immediately exposes the patient, the desired union of the wound is also considerably interrupted. The whole surface of the wound must always be well cleaned with a sponge and warm water, as any coagulated blood would be a considerable obstruction to a quick union of the parts.

Let the skin and muscles be now gently brought forwards; fix the flannel circular roller round the body, and carry it, two or three times rather tight round the upper part of the thigh, as at this point, it is intended to form a sufficient basis, that materially adds to the support of the skin and muscles. Then carry it forwards in a circular direction, to the extremity of the stump, not so tight as to press rudely or forcibly, but so as to give an easy support to the parts.

You are now to place the skin and muscles over the bone, in such a direction, that the wound shall appear only as a line across the face of the stump, with the angles at each side, from which points, the ligatures are to be left out, as their vicinity to either angle directs. The skin is easily secured in this posture by long slips of linen, or lint, about two fingers in breadth, spread with cerate, or any cooling ointment. If the

skin do not easily meet, strips of sticking plaster are best. These are to be applied from below upwards, across the face of the stump, and over them a soft tow pledget and compress of linen; the whole to be retained with the many-tailed bandage, with two tails to come from below upwards to retain the dressings upon the face of the stump.

Mr. Alanson thinks it very injudicious to raise the end of the stump far from the surface of the bed with pillows, as the posterior muscles become drawn upward by so doing. It is best to raise the stump about half a hand's breadth from the surface of the bed, by which the muscles are put in an easy relaxed position. The many-tailed bandage is much more convenient than the woollen cap, frequently used to support the dressings, though this seems well calculated to answer that purpose: but, if not put on with particular care, the skin is liable to be drawn backwards from the face of the stump, nor can the wound be dressed, without first lifting up the stump to remove the cap.

Mr. Hey thinks the place of the incision through the muscles, the height to which the skin must be retracted, and the place, where the bone must be sawn above the first incision, might all be reduced to determinate measures. A few experiments would enable you to determine precisely, in any limb of given circumference, how many inches the skin must be retracted, &c. and these might be measured by an assistant, if he had little bits of straw, or wood, marked for this purpose. The determination of the proper quantity of skin to be saved will be much sssisted by reflecting that the diameter of a circle is a trifle more than one third of its circumference; but, to call it one third will be sufficiently exact for our purpose. Hence, if we perform the flap operation, upon a limb, the circumference of which is nine inches, the flap required to cover this wound must be somewhat more than three inches long; and by the same rule, the quantity of integuments necessary to be preserved to cover a stump of given circumference in any limb, operated upon without the flap, is easily determined.

If the limb be large, the division of the cellular and membranous attachments must be extended in proportion. In emaciated limbs, little more than the oblique turn of the knife to lay bare the bone sufficiently high, will be necessary for the preservation of as much skin, &c. as will cover the wounded surface, and, when practicable, the preference should always be given to the latter mode.

Mr. Alanson used to operate with a double-edged knife, rather smaller, than a common amputation one, than which it is more handy; and being more rounded at the point, than the straight-edged knife, it completes the division of the attachments, and the oblique section of the muscles, more speedily; and, in the whole operation, it has an advantage, that either edge will cut by the slightest turn of the hand. (See *Alanson's Practical Observations on Amputation.*)

AMPUTATION OF THE THIGH, AS PRACTISED BY THE BEST MODERN SURGEONS.

The thigh ought always to be amputated as low as the disease will allow. The patient is to be placed on a firm table, with his back properly supported by pillows, and assistants, who are also to hold his hands, and keep him from moving too much during the operation. The ankle of the sound limb is to be fastened by means of a garter, to the nearest leg of the table.

The next thing is the application of the tourniquet. (For a description of this instrument see *Tourniquet*). The pad should be placed exactly over the femoral artery, in as high a situation, as can conveniently be done. When the thigh is to be amputated very far up, it is perhaps better to let an assistant compress the femoral artery in the groin, by any commodious instrument, having a round blunt end, calculated for making direct pressure on the vessel, without injuring the integuments. Were the patient, however, very weak, and unable to bear loss of blood, as there might, in this way, be some bleeding, by reason of the anastomoses with the branches of the internal iliac artery, it would be better to employ the tourniquet, if possible. Whether the right or left thigh is to be removed, it is customary for the operator to stand on the patient's right side. The great advantage of this situation seems to be, that the surgeon's left hand can be thus more conveniently, and quickly brought into use, than if he were always to stand on the same side, as the limb he is about to amputate. This seems to be the only assignable reason for this habit: for, when the left thigh is to be amputated, it is certainly some inconvenience to have the right limb, between the operator, and the one that is to be removed. But, perhaps, this is less inconvenient than not having the left hand next the wound.

An assistant, firmly grasping the thigh with both hands, is to draw upward the skin and muscles, while the surgeon makes a circular incision as quickly as possible through the integuments down to the muscles. When the thigh is bulky, the large amputating knife will be found the best. Before beginning this first cut, the arm is to be carried under the limb, till the knife reaches almost round to the same side on which the operator stands. With

one sweep, penetrating to the fascia, the knife is then to be brought round to the point, where it first touched the skin. Thus the wound is more regularly made, than by cutting first on one side, then the other, and the patient is saved some degree of pain, in consequence of the uninterrupted quickness, with which the incision is made.

The cellular substance, connecting the skin, immediately above this wound, with the fascia, is next to be divided all round the limb, till as much skin can be drawn back, as will afterwards conjointly with the muscles, cut in a mode described in the foregoing account of Mr. Alanson's plan, cover the end of the stump with the utmost facility. The detached skin is to be turned up, in order to be out of the way, at the time of cutting the muscles, and sawing the bone. Here it seems useless to repeat the explanation of the division of the muscles, as practised by Mr. Alanson, and still adhered to by the generality of surgeons.

M. Louis, a French surgeon of extraordinary talents, endeavoured to introduce into practice the plan of dividing the loose muscles first, and lastly those, which are closely connected with the bone. This eminent man took notice, that the muscles of the thigh became retracted in an unequal degree, after being divided. Those which are superficial, and extend along the limb, more or less obliquely, without being attached to the bone, were drawn up with greater force, and in a greater degree, than others, which are deeply situated, in some measure, parallel to the axis of the femur, and fixed to this bone throughout their whole length. The retraction begins the very instant, when the muscles are cut, and is not completed till a short time has elapsed. Hence, the effect should be promoted, and be as perfect as possible, before the bone is sawn. M. Louis was always desirous of letting the muscles contract as far as they could in the amputation of the thigh, and, for this reason, he was rather averse to using the tourniquet, as the circular pressure of this instrument counteracted, in some measure, what he wished to take place, and hence he even advised making pressure on the artery by means of an assistant.

Actuated by such principles, M. Louis practised a kind of double incision, different from either Cheselden's, or Alanson's method. By the first wound, he cut, at the same time, both the integuments and the loose superficial muscles; by the second, he divided those muscles, which are deep, and closely adherent to the femur. On the first, deep, circular, cut being completed, M. Louis used to remove a band, which was placed round the limb, above the track of the knife. This was taken off, in order to allow the divided muscles to become retracted without any impediment. He next cut the deep adherent muscles, on a level with the surfaces of those loose ones, which had been divided by the first incision, and which had now attained their utmost state of retraction. In this way, he could evidently saw the bone very high up, and the painful dissection of the skin from the muscles was avoided. M. Louis was conscious, that there was more necessity for saving muscle than skin; he knew, that when an incision is made at once down to the bone, the retraction of the divided muscles always left the edge of the skin projecting a considerable way beyond them. Hence he deemed the plan of first saving a portion of skin, by dissecting it from the muscles, and turning it up, quite unnecessary. The impartial reader, who takes the trouble to read the remarks on amputation, published by this greatest of the French surgeons in the Mem. de l'Acad. de Chirurg. will at once be impressed with the force and perspicuity of the matter, and with the evident propriety of a good deal of the practice inculcated. It gives me pleasure to remark, that many excellent surgeons, whom I have seen operate, do not exactly follow Mr. Alanson's plan of cutting in an oblique manner at once down to the bone, after the integuments have been cut, detached, and reflected; but, so far adopt the principles of M. Louis, as to divide the loose muscles first, immediately after saving the necessary quantity of skin, and, lastly, those, which are intimately attached to the bone throughout their whole extent. This is certainly a better mode of operating, than to follow precisely Mr. Alanson's directions. Candour, however, obliges me to confess, that the attempt to divide the loose muscles first, and then the more fixed ones, is very apt to make an unskilful surgeon cut the whole, or a great part, of the same muscle through more than once; a fault in modern practice, which, as far as my judgment extends, deserves reprobation, as much as any proceeding that can be instanced. To say how unnecessary it is to divide any muscle more than once, is as needless as to remind the reader of its doubling the agony of a very severe operation.

Having cut all the fibres on every side, down to the bone, a piece of linen, somewhat broader than the diameter of the wound, should be torn at one end, along its middle part, to the extent of about eight or ten inches. This is called a retractor, and is applied by placing the exposed part of the bone in the slit, and drawing the ends of the linen upward on each side of the stump. In this manner, the retractor will obviously keep every

part of the surface of the wound out of the way of the saw. I have seen this instrument do so much mischief, in consequence of the operator neglecting to use the retractor, that my conscience obliges me to censure such surgeons as are in the habit of employing the saw, without defending the soft parts by this simple contrivance. Some have rejected the use of the retractor, because they have seen it get under the teeth of the saw, and obstruct the action of the instrument; but, this very circumstance adduced against the retraction, is, when considered, the strongest one that could possibly be brought forward in its favour, as the surface of the wound itself, and particularly the edges of the skin, would, in all probability, suffer the same fate as the linen, by getting under the teeth of the saw, if no retractor were employed, in attempting to saw the bone high up, as closely as possible to the soft parts. I think no one can urge any but the most frivolous objections to the use of the retractor, and I know that many who have been with myself eye-witnesses of the mischief frequently done by the saw in amputations, are deeply impressed with an aversion to the neglect of this bandage. I have often seen the soft parts adroitly divided, and I have in these same instances, seen the operators, directly afterwards, lose all the praise which every one was ready to bestow, by their actually sawing through one half of the ends of the muscles together with the bone. Men who have had fortitude not to utter a sigh, nor to let a groan be heard, in the previous sufferings, have now had their involuntary cries extorted from them by unnecessary, unjustifiable torture. But, besides defending the surface of the stump from the teeth of the saw, the retractor will undoubtedly enable the operator to saw the bone higher up than he otherwise could do.

Another proceeding, which seems fit for reprobation, and which, indeed, Mr. Alanson very properly condemned, is the practice of scraping up the periosteum with the knife, as far as the muscles will allow. Nothing seems more probable, than that this may be the cause of the exfoliations which occasionally happen after amputations. At all events, it is a superfluous, useless measure, as a sharp saw, such as ought to be employed, will never be impeded by so slender a membrane as the periosteum. All that the operator ought to do, is to take care to cut completely down to the bone, all round its circumference. Thus a circular division of the periosteum will be made, and upon this precise situation the saw should be placed. (*First Lines of the Practice of Surgery. Edit.* 3.)

But, in no part of the operation of amputation do operators in general display more awkwardness, than in sawing the bone, though perhaps not of that pernicious sort as the errors already noticed. At the time of sawing the bone, much depends upon the assistant who holds the limb. If he should elevate the lower portion of the thigh bone too much, the saw becomes so pinched that it cannot be worked. On the other hand, should he allow the weight of the leg to operate too much, the thigh bone will break before it is nearly sawn through, and its ends will be splintered. It is one of the most common remarks of such persons, as are in the habit of frequently seeing amputations, that the part of these operations, which a plain carpenter would do well, foils the skill of a consummate surgeon, and few operators acquit themselves well in using the saw. Many of them begin the action of this instrument, by moving it in a direction contrary to the inclination of its teeth. Many, seemingly through confusion, endeavour to shorten this part of the operation, by making short, very rapid, and most convulsive strokes, with the saw. Almost all operators fall into the error of bearing too heavily on the instrument. That operator will saw best, who makes the first stroke of the saw, by applying its heel to the bone, and drawing the instrument across the part, towards himself; this makes a slight groove in the bone, which serves very materially to steady the future operations of the instrument; who makes long, regular sweeps with the saw, rather slowly than quickly, rather lightly than heavily. But, there is often a fault in the construction of the saw itself, which impedes its action, quite independently of any fault on the part of the surgeon himself. I allude to not having the edge of the instrument a little broader than its blade. When the saw is well made, the teeth always make plenty of space for the rest of the instrument to move in.

If the bone should happen to break before the sawing is finished, the sharp pointed, projecting spiculæ thus occasioned, must be removed by means of a strong, cutting sort of forceps, termed *bone nippers*.

After the removal of the limb, the femoral artery is to be immediately taken hold of with a pair of forceps, and tied, taking care to leave the accompanying branches of the anterior crural nerve out of the ligature. None of the surrounding flesh ought to be tied, though the ligature should undoubtedly be placed round the artery, just where this vessel emerges from its lateral connections. Mr. Hey has been accustomed to tie the femoral artery twice, leaving a small space between the ligatures, and this method has been constantly used in the Leeds Infirmary. Some reasons against this plan will be found in the

article (*Hemorrhage*). The other arteries are usually taken up with a tenaculum. After tying as many vessels as require it, one half of each ligature is to be cut off near the knot on the surface of the stump. One portion is quite sufficient for withdrawing the ligature when this becomes loose, and the other being only an extraneous body, and productive of irritation and suppuration, should never be allowed to remain. Mr. Alanson directs the ends of the ligatures to be left hanging out at the two extremities of the wound, according as their nearness may point out as best. But when a ligature is situated in the centre of the wound, it is best to bring it out between the strips of adhesive plaster, at the nearest part of the surface; otherwise its running across one half the wound to get at either angle, would create a great deal of unnecessary irritation and suppuration.

Sometimes, the sawn surface of the bone itself bleeds rather profusely. When this happens, it is an excellent plan, which I have often seen Mr. Ramsden and others adopt with the greatest success, to hold a compress of lint over the end of the bone, during the time requisite for securing the rest of the vessels. At the end of this period, the compress may generally be taken away, as the bleeding from the bone will have entirely ceased. As Monro remarks, the surgeon ought not to content himself with tying only such vessels, as he observes throwing out blood, while the patient is faint with pain; he should endeavour to rouse him from that faintish state by a cordial, and then wiping off the coagulated blood with a sponge, wet in warm water, he should examine narrowly all the surface of the stump, otherwise he may expect to be obliged by a fresh hemorrhage to undo all the dressings. (*On Amputation of the Larger Extremities*, p. 475. *Monro's Works.*)

In the account of Mr. Alanson's plan, we have explained how the wound is to be brought together with strips of sticking plaster. Over these, and the ends of the ligatures, it is best to place some pieces of lint, spread with the unguentum spermatis ceti, to keep them from sticking, which becomes an exceedingly troublesome circumstance, when the dressings are to be removed. I am decidedly averse to the general plan of loading the stump with a large mass of plasters, pledgets, compresses, flannels, &c. I see no reason, why the strips of adhesive plaster, and a pledget of simple ointment, should not suffice, when supported by two cross bandages, and a common linen roller, applied in a circular way, round the limb, from above downward. The first turn of the roller, indeed, should be fixed round the pelvis. The two cross bandages, often called the Malta-cross, are to be put over the end of the stump, one in each diameter.

I am completely of opinion with Mr. Alanson, that the elastic woollen cap, commonly placed over all the bandages and dressings, if not put on with a great deal of care, has a tendency to push the skin backward from the extremities of the stump, and as it must also heat the part very much, its employment ought apparently to be discontinued.

If possible, the dressings should never be removed before the fourth day, not reckoning the one on which the amputation was performed. Monro set down the fifth, sixth, or seventh day, as generally soon enough for this purpose. He allows, however, that, if the smell of the wound should become offensive, the outer dressings may be removed sooner. Even when the dressings are to be taken away, it will frequently be found useful not to remove one strip of plaster; but, the stump must be made clean, and any discharge present washed away. (*Monro.*)

At the end of five or six days, the surgeon may begin to try, in a very gentle manner, whether any of the ligatures are loose. However, he should not use the smallest force, nor persist if the trial should create pain. One would hardly try, whether the ligature on the main artery is loose, before the eighth or ninth day.

Though, in the above account, we have directed the edges of the wound, after the amputation of the thigh, to be brought together in such a way, that the wound shall appear as a line across the face of the stump, yet there are instances in which the bone seems most easily and conveniently covered, by making the line of the wound in a perpendicular direction. Mr. Alanson objected to the latter mode, asserting, that the cicatrix afterwards became situated immediately over the end of the bone, the pressure of which was very likely to make the part ulcerate. However, in St. Bartholomew's Hospital, a thigh was, some time since, amputated by Mr. Harvey, and the edges of the stump were brought together in the perpendicular direction, yet, according to all accounts, a better stump could not have been made. In a case, in which I assisted Mr. Ramsden at Christ's Hospital, when an attempt was made to put up the wound in the common manner, the bone seemed to make considerable pressure against the skin, which did not happen, when the line of the wound was made in the other direction, which of course was immediately adopted. Mr. Hey has noticed this subject as follows: the integuments and

muscles may be brought into contact by pressing either the anterior and posterior parts, or the sides of the thigh, together. The former method, by the gradual retraction of the posterior muscles, causes the integuments of the anterior part of the stump to cover more completely the extremity of the bone. The latter method causes the integuments and muscles to meet each other the more readily, and, therefore, is to be preferred, when the quantity of soft parts preserved is somewhat deficient. (*Practical Observations on Surgery, p.* 533, *edit.* 2.)

HEMORRHAGE AFTER AMPUTATION.

Bleeding, after the operation, is of two kinds, in regard to the time, when it occurs. The first takes place within twenty-four hours after the operation. Hence, an assistant should always be left with the patient, with directions carefully and repeatedly to look at the stump, and if any bleeding should arise, to apply the tourniquet, until further aid is obtained. In case no assistant can be spared for this purpose, as must frequently happen in country practice, the tourniquet should always be left slackly round the limb, and the nurse, or patient, himself, directed to turn the screw of the instrument, in order to tighten it in case of need. A slack tourniquet left round the limb, after amputation, cannot do harm, and its not having been ready in this way, has cost many patients their lives, as I have known instances of.

This kind of hemorrhage has often been known to arise from the pressure of a tight bandage round the stump. As Monro observes, the circular turns of the bandage, when tight, must stop the return of blood in the cutaneous veins, and by making thus a greater resistance to the blood in the arteries, which anastomose with them, occasion the contracting power of the heart and arteries to dilate, and force more blood into their other branches; but, these being cut in the amputation will pour out their blood, and so an hemorrhage is brought on. Making much pressure round a stump is highly deserving of reprobation, and whenever there is an universal oozing of blood, be sure, that the circulation in the superficial veins is not impeded by the tightness of the bandage.

If the bleeding should not be from an artery of consequence, the application of linen, dipped in the cold saturnine lotion, will sometimes check it, and the disagreeable necessity for removing the dressings and opening the wound, may thus be avoided.

But it often happens, that the wound must be opened, and the bleeding vessel tied. This is a very painful proceeding to the patient, and when the dressings have been applied some hours, so that the stump has had time to inflame, nothing can exceed the suffering to which the patient is subjected. Here we see the prudence of being very careful to tie every suspicious vessel in the first instance.

The second sort of hemorrhage, after amputation, arises from ulceration of the large arteries, and may occur a month after the operation, when the ligatures are all away, and the patient seems nearly well.

Two such cases are related by Mr. Bromfield (Vol. I. p. 307.) This kind of bleeding is less common than formerly, now the plan of covering the stump with sound skin is adopted. When the bleeding vessel is large, there is no chance of putting the patient out of danger, except by cutting down to the vessel, and tying it. The trunk of the vessel can sometimes be more conveniently tied, than the bleeding branch itself.

Mr. Hey makes mention of a particular sort of hemorrhage, after the operation: "I have seen (says he) a few instances of the integuments becoming so contracted after the operation, as to compress the veins just above the extremity of the stump, and bring on after some hours a copious hemorrhage. When it has appeared clear to me, that the hemorrhage was venous, I have made a division of the integuments, on one side of the thigh, sufficient to remove the stricture, and this method has immediately suppressed the hemorrhage." (P. 530, edit. 2.)—I shall make another extract from this interesting author on the present subject.

"When we are under the necessity of amputating a limb, that has suffered great contusion, though the operation is performed upon a part apparently sound, the wound sometimes becomes sloughy and ill conditioned. No good granulations arise to cover the extremities of the arteries; but the ligatures cut through these vessels, or becoming loose, cease to make a sufficient pressure upon them, and hence repeated hemorrhages ensue. This is a dangerous state for a patient; for, if the vessels are taken up afresh with the needle, the hemorrhage will now and then return in the course of two, or three days. In such cases, the application of dry sponge, cut transversely, as directed by Mr. White (*Cases in Surgery*), has been found singularly useful, and has saved the life of the patient. But, a constant pressure must be kept upon the pieces of sponge, by the fingers of a succession of assistants, till granulations begin to arise upon the stump, and the prospect of future hemorrhage disappears. This method is of the greatest importance after amputation on the thigh,

or leg, where the great vessels are deeply seated. In the arm, above the elbow, where the vessels are more superficial, the great artery may be taken up, with a portion of muscular flesh, above the surface of the stump, by making first an incision through the integuments. My colleague Mr. Logan, has done this twice within the last year, with complete success, when repeated ligatures, applied in the usual way, had failed."

"In the morbid sloughy state of the stump, above-mentioned, the application of lint, soaked in a liquid, composed of equal quantities of lemon juice and rectified spirit of wine, has been found very advantageous, and has caused it to put on soon a healthy aspect." (*P.* 536, 537, *edit.* 2.)

SPASMS OF THE STUMP.

Spasmodic contractions of the muscles of the stump is another very afflicting occurrence. Such spasms put the patient to the greatest agony, and, in some cases, increase so much as to affect the whole body, and even occasion death. But, this unfortunate affection, which was rather frequent after amputations performed in the ancient manner, is infinitely less so, after the modern improved plans of operating, tying the vessels, and dressing the wound. When such spasms, however, do occur, the stump must be kept from starting, by fastening it to the pillow and bedding, on which it lies, and opium, and camphorated medicines, are to be liberally exhibited. (*Encyclopédie Méthodique, Partie Chirurgicale, Tom.* 1, *p.* 93. *Latta's Surgery, Vol. III.* &c.)

AMPUTATION BELOW THE KNEE.

In treating of amputation of the thigh, we have remarked, that as much of the limb as possible should be preserved. The longer it is after the operation, the stronger and more useful will it be found. But, when the leg is to be amputated, authors have set it down, as almost an invariable rule, that the operation is to be performed a little way below the knee, even though the disease, for which the limb is removed, may be situated in the foot, or ankle, and would allow the operation to be done much further down. The common practice is to make the incision through the integuments, just low enough to enable the operator to saw the bones, about four inches below the lowest part of the patella. This degree of lowness is necessary, in order not to deprive the stump of that power of motion, which arises from the flexor tendons of the leg continuing undivided. It is alleged also, as a reason for this mode of proceeding, that it is quite sufficient to preserve a few inches of the leg, in order to afford the body a proper surface of support, in walking with a wooden leg; whereas if a larger portion were saved, the superfluous part would be a great inconvenience both in walking, and sitting down, without being of the smallest utility, in any respect whatever.

The tourniquet should be applied to the femoral artery, about two-thirds of the way down the thigh, just before the vessel perforates the tendon of the triceps muscle. This place is much more convenient than the ham. The patient is to be placed upon a firm table, as in the amputation of the thigh, and the leg being properly held by one assistant, while the integuments are drawn upward by another, the surgeon, with one quick stroke of the knife, is to make a circular incision through the integuments all round the limb. Some recommend the operator to stand on the inside of the leg, in order that he may be able to saw both bones at once. No reflections could ever make me perceive, that any real advantage ought strictly to be imputed to this plan. Many suppose this method diminishes the chance of the fibula being splintered, by this bone being completely divided rather before the tibia. But, splintering the bones arises from the assistant depressing the limb too much, or else not supporting it enough. It would be difficult to explain, why the tibia, in this plan, should not be splintered, instead of the fibula, when a certain thickness of it has been sawn through, if the assistant should be guilty of the above mismanagement.

Having made a circular cut through the integuments, the next object is to preserve skin enough to cover the front of the tibia, and the part of the stump, corresponding to the situation of the tibialis anticus, extensor longus pollicis pedis, and other muscles between the tibia and fibula, and those covering the latter bone. Throughout this extent, there are no bulky muscles, which can be made very serviceable in covering the end of the stump, and consequently, the operator must take care to preserve sufficient skin in this situation, by dissecting it from the parts beneath, and turning it up.

On the back part of the leg, on the contrary, the skin should never be detached from the large gastrocnemius muscle, which, with the soleus, will here form a sufficient mass for covering the stump. Hence, as soon as the skin has been separated in front, and on the outside of the leg, the surgeon is to place the edge of the knife in the division of the integuments behind, and cut directly through the muscles of the calf, from the inner edge of the tibia quite across the fibula, supposing the operator to be on the patient's left

side. Then the flap formed by the integuments, and muscles of the calf, is to be held back by one of the assistants, while the surgeon completes the division of the rest of the muscles, together with that of the interosseous ligament, by means of the catling, a kind of long, narrow, double-edged knife.

It is of great consequence that the knee should be bent, when the gastrocnemius and soleus are to be divided, as these muscles will then be cut through much lower down, than they would be, if the leg were extended, so as to put them in a state of tension.

In amputating below the knee, very particular care must be taken to cut every fasciculus of muscular fibres, before using the saw. Every part, except the bones, being divided, the soft parts are next to be protected from the teeth of the saw, by a linen retractor, made with two slits to receive the two bones.

On the leg, there are only three principal arteries, requiring ligatures, viz. the anterior, and posterior tibial, and the peroneal, arteries.

Whether the above plan of amputating the leg so high up, when the foot, or ankle, is the part diseased, or injured, be on the whole most advantageous, I cannot presume to determine. There are certainly many clever men who condemn the practice, and though we see it pursued by the best surgeons in this metropolis, yet, we may safely assert, that the matter requires further consideration. If it were a decided point, that the common custom of bending the knee, for the sake of bearing the weight of the body on its anterior part, were the only one admissible, after amputation of the leg, there could be no doubt of the propriety of performing the operation a little way below the knee, in preference to any other situation. But, since there have been numerous instances of persons walking very securely with machines, which allow them to make use of the knee, and are more pleasing to the eye, on account of their perfect resemblance to a natural limb; and since also, the operation at the lower part of the leg, is more easy of performance, and safer, than when done high up; some very eminent surgeons have thought that it ought always to be done near the ankle, when possible, instead of near the knee.

Mr. White of Manchester, in a paper dated 1769, (*Med. Obs. and Inq. Vol.* 4.) informs us, he took the hint to amputate a little above the ankle, from seeing a case, in which this had been done by a simple incision, with such success, that the patient could walk extremely well, though with a machine, that was very badly constructed. After this Mr. White began to operate above the ankle with the double incision; and he invented a machine much better calculated for the patient to walk upon.

In 1773 Mr. Bromfield published his *Chirurgical Cases and Observations*, wherein he mentions his having begun about the year 1740 to amputate above the ankle, in a case of gangrene of this part of the leg. The patient walked so well, with the aid of a very simple machine, both along a level surface, and in going up and down stairs, that it was difficult to perceive he had lost his foot. Mr. Bromfield was persuaded, however, to give up this practice, until he learnt, in 1751, that a Mr. Wright had thrice amputated in this way with success, when he again had recourse to it, without the least unpleasant consequences.

The operation just above the ankle is less painful, because there is not so much substance to be divided, as in the calf. There is also more facility in covering the bone entirely with skin. The wound would generally require less time to heal; its smaller size, and the greater exactness, with which its opposite edges can be brought into contact, are circumstances, which would fully warrant this conclusion, even were the sentiments of experienced men totally out of the question.

The advantage of amputating a little below the knee, is that pressure on walking with a wooden leg, is entirely confined to the front of the limb, and the cicatrix itself is subjected to no sort of irritation whatever. After amputating at the ankle, the pressure in walking operates directly on the cicatrix; but, if the mechanical contrivances for walking are now brought to such perfection, that this pressure does no harm, the operation should not be abandoned on this account.

AMPUTATION WITH A FLAP.

This was first proposed by Loudham, an English surgeon, and published by Jacob Young, in 1679, in his *Currus Triumphalis ex Terebinth.* It was successfully practised by several others; but soon fell into disrepute, probably in consequence of the rude measure adopted for stopping the hemorrhage, and the badness of the treatment of the stump, by which causes, pain, inflammation, and extensive suppuration must have been produced.

The following historical account of the flap amputation was drawn up by the celebrated M. de la Faye, and is inserted in the Memoires de l'Acad. de Chirurgie, Tom. 5, Edit. in 12mo. Being desirous of bringing into this dictionary as much of the valuable matter of those highly admired memoirs, as I conveniently can, I shall now present the reader with the whole of La Faye's observations on this

subject. In perusing the account, it is to be recollected, that La Faye was a zealous advocate for the method, which, though at present thought well of by a few, is not extensively approved. La Faye's relation, however, is truly interesting, for it makes us at once acquainted with all the principal arguments and reasons, which have been adduced in favor of the operation, and it explains to us the different plans of performing it, which were followed by such surgeons, as made the earliest trials of it. The description of the new machine for compressing the stump is less interesting now, than formerly, when a main argument in support of this operation was, that the flap, when applied and pressed upon the stump, stopped the bleeding, and rendered ligatures unnecessary. I have chosen, however, not to omit the account of the instrument, in order that the reader may possess the whole of the memoir.

MEMOIR BY M. DE LA FAYE ON THE FLAP AMPUTATION.

Though surgeons have diligently applied themselves, for more than a century, says La Faye, to bring the ordinary method of amputation to perfection, yet still there are such defects found in it, as the greatest masters have not been able to remedy. According to this method, a ligature is put on the vessels, which produces great pain, and sometimes convulsive motions in the patient: the bones remain bare, and must exfoliate, which requires a considerable time; it has been sometimes necessary to saw them a second time; the wound is of a large extent; the suppuration, which is very copious, greatly debilitates the patients, and the cure becomes exceeding tedious.

The reflections, made by several surgeons at the end of the 17th century, as well as by those of the present, on these inconveniences, have induced them to think, that, by preserving a flap of flesh and skin, for covering the stump, the operation would be rendered less painful, more certain, and the cure much quicker. From this portion of flesh, the new method of taking off a limb, has been stiled the flap-amputation. I shall here examine the different notions of those, who have invented or followed this method, and propose such as have occurred to me on this subject.

The amputation, with the double incision, is very recent; though it has been surmised by some persons, that Celsus had pointed it out in the following words, lib. 7, cap. 33. *Levanda est, suprùque inducenda cutis, quæ sub ejus modi curatione laxa esse debet, ut quam maximè undique os contegat.* "The skin, which in this sort of operation, ought to be lax, must be drawn upwards, to the end that it may be afterwards brought down, so as to cover the bone as much as possible." For my part, I cannot discover in these words any thing else besides the ordinary method, and nothing like an amputation, where a flap is preserved to cover the stump. It is in the Acta Eruditorum of Leipsic, of the year 1697, that we must search for the epocha of this new method. We there find a book quoted, which was written in English, with this Latin title, Currus triumphalis ex Terebenthina, published in 1679, by Jacob Young, an English surgeon, with the extract of a letter, which this author has printed at the end of his book. In this letter, mention is made of one Loudham, an Englishman, who had invented a new manner of amputation. According to this method, a piece of flesh and skin is preserved, on one side of the part which is to be cut off, and applied on the stump, after the separation of the limb; which abridges the time of the cure, and facilitates the application of a wooden leg. At first, the utility of this method was not much attended to. But eighteen years afterwards, that is to say, in 1696, Verduin, a famous surgeon of Amsterdam, after having put it in practice, wrote a Latin dissertation on this head, printed at Amsterdam the same year, which M. Manget has inserted in his Bibliotheque Chirurgique. The next year, an extract was made of it at Leipsic, as already observed. In 1702, Sabourin, a very able surgeon of Geneva, proposed it to the Royal Academy of Sciences, which suspended its judgment, till they had such proofs as experience might furnish them with. It is not known whether Verduin and Sabourin had read Young's book; so that it cannot be ascertained, whether we ought to attribute to them the glory of having invented this new method. We cannot, however, refuse them, at least, that of having brought it into vogue. Verduin contrived certain bandages; and Sabourin extended this practice of amputating with the double incision, even to the articulations.

The imperfections, which Verduin discovered in the manner of amputating then in vogue; the embarrassment caused by the apparatus, and the danger of a mortification, made this practitioner out of conceit with the ordinary method. The facility wherewith nature re-unites the divided parts (a circumstance more especially observed in the operation of the hair-lip, and in wounds of the head, where the cranium is found denudated) was the principal motive that induced him to search out, or to follow the new method. He was for some time stopped by a considerable difficulty. He knew not whether

flesh would unite with a bone which had been sawn, and full of marrow. Hippocrates, Celsus, Paul D'Ægina, Paré, Talicotius, the Fabricii, and several other authors, whom he consulted, afforded him no light on this head. Moreover, he dreaded the effects of envy and calumny; but a letter, he received from a friend, who had been formerly his pupil, removed all his scruples. This letter informed him, that the method he was so anxious about, had been practised with all possible success, by a famous surgeon of London. Perhaps this surgeon was Loudham, of whom we have made mention. This seems to prove that Verduin had really invented what another had found out, eighteen years before him. The description, which he has given of his new method, is so perfect, that those who have written after him, have been able to add but very little to it. Here follows an extract of it.

Two compresses are applied, one under the ham, and the other on the course of the large vessels. The thigh is wrapped in a fine linen cloth, which is sustained by some turns of a roller. The whole part is encompassed with a strip of dressed leather, six inches broad, furnished with three straps with buckles, to secure it round the part. The tourniquet is placed in the usual manner. The part, above the place intended to be amputated, is surrounded with a leather strap. The leg, being held by the assistants, the left hand is clasped round the calf, below the second ligature. The point of a crooked knife, which is made to pass as near as possible to the bones, is thrust in on one side, so as to come out on the other. The knife is made to descend pretty near to the tendo achillis, and thus separates almost the whole calf of the leg, to which it is held only by the upper part, and which is raised towards the thigh; after which the operation is finished in the ordinary manner. The wound is then washed with a wet sponge, to clear it of the fragments of the sawn bone. The leather strap, which served to secure the flesh, is loosened; the calf of the leg is clapped on the stump; it is a little compressed, by pushing it from the hinder towards the fore part. In order to maintain it, the wound is dressed with lycoperdon, lint and tow. The whole stump is wrapped up in a bladder, which is sustained by slips of sticking plaister. On this bladder are applied a compress, and a concave plate, which are sustained and compressed by means of two straps crossing each other, and attached to the large leather strap which surrounds the thigh.

For the second apparatus, an instrument of tin, called by Verduin, soutien, is made use of. It is furnished with a compress, and composed of three pieces; the one a kind of goutiere or hollow, the other a sheath, and the third a plate. The goutiere contains the hinder part of the thigh, as far as the articulation of the knee. The sheath, which is fastened to the goutiere, covers the hinder part of what remains of the leg. The plate covers the surface of the stump, and is joined to the sheath, by a lamina, that passes between the two bits of tin, which compose this second piece, and maintained by means of a screw. The use of this third piece, is, to sustain the flap, which is applied on the stump, by compressing it, but gently, for fear of bruising it. Verduin and Ruysch, Mess. Manget and Garengeot have given the figures of all the instruments, of which we have been speaking.

The dissertation of Verduin has been printed in Dutch, High-German, Latin, and French. Almost all the authors, who have made mention of it, such as Ruysch, Reverhorst, Goelick, Verduc, Mess. Manget and Garengeot, speak in its favour, and give an extract of it.

M. De Garengeot has, notwithstanding, thought it necessary to make several alterations in this method. He says, that, to keep the flesh firm, any other strap may be made use of, besides a leather one; and that it ought to be placed on the tuberosity of the tibia. He prefers to Verduin's crooked knife, that of M. Petit with the double edge. He would have the semicircular incision made, before that by which the flap is separated. He prescribes the giving some strokes, with the point of the knife, on the extremity of the bone which is to be preserved, and to raise the flap with a slit compress, whilst the bone is sawn. He advises the cutting off the overplus of the flap applied on the stump, and to sustain it by some stitches; or rather to employ the dry suture, which, according to him, is much better.

After the testimony of so many illustrious authors, it is astonishing that Heister, in the new book of surgery, which he has lately published, should say, that few authors approve this new method; and that it has been discarded by the English, and even by Verduin himself. He pretends that the hemorrhage, and several other accidents, which are often, as he imagines, the consequences of the new method, have caused the death of a patient, on whom Sabourin had practised it, at the Charité of Paris. Duverney and Mery, who have given an account of this case to the Royal Academy of Sciences, have not formed the same judgment of it as Heister; and we know what regard ought to be paid to the sentiments of those gentlemen.

Junkers, in his book, entitled, Conspectus Chirurgiæ, thinks, that the new method occasions a great deal of pain; but if it be compared with the old one, it

will be readily allowed, that this causes much more. The strongest objection which Mess. Heister and Junkers have advanced against the amputation with the flap incision, is as follows: the little eminencies of the amputated bones, prick the flesh wherewith they are covered, and excite inflammatory pains. In this kind of amputation, the bones are covered with a flap of flesh and skin; consequently the patient is exposed to painful prickings and inflammation. But these inequalities, says La Faye, do not appear to me capable of producing these accidents. I have seen many fractures without this effect, although they had not been reduced, and the flesh must have touched the asperities of the fractured bones. I have even examined some of these fractures, after the death of the subjects; and have found, a year after the accident, that the ends of the bone were glued, and firmly adherent to each other; and that the surface of each extremity of the bone had no asperity, but was, on the contrary, even and smooth like a nipple. Hence it appears, that we ought to be under no apprehension, either before or after the cure, of the flesh being pricked by the inequalities of the sawn bone. Besides, experience, which, in matters of practice, must always prevail over reasoning and speculation, is sufficient to answer the objection. M. Manget, in his Bibliotheque de Chirurgie, says, that Sabourin had performed the operation of the flap amputation on a man, who was afterwards seen to walk with ease in Geneva, whose streets are on a declivity. M. Garengeot, in the first edition of his operations, relates, that M. Petit has seen officers, on whom the new method had been practised, dancing and leaping with their artificial legs, as if they had been real ones.

The advantages, which Verduin attributes to this method, are very considerable. He pretends, in the first place, that the flap, applied on the orifices of the vessels, stops the hemorrhage, without ligature, and without astringents. Secondly, that there is less danger of a gangrene. Thirdly, that these is no exfoliation of the bones; and that the cure is much quicker, and the cicatrix less unsightly. Fourthly, that a wooden leg is much better adjusted to the stump; and that the patient walks with greater freedom. Fithly, that the patients feel no sympathetic pains, which follow from the amputation performed in the ordinary manner. Ruysch adds, that bad symptoms are less to be apprehended after this operation, because the nerves, the bones, and the tendons, are covered with their proper teguments.

Of these six advantages here enumerated, says La Faye, I can discover no more than four which have any existence: to wit, the quickness of the cure, from the bones not exfoliating; the facility of applying a wooden leg; the inutility of the ligature and astringents, which are supplied by the flap; and, in fine, the small portion of sensible parts, which is left exposed to the air. It ought to be observed here, that Verduin seems as though he would say, that the flap is generally applied on the orifice of the vessels. Nevertheless, it is evident, that, of the three arteries, which are distributed to the leg, namely, the tibialis anticus, the tibialis posticus, and the peronæus: it is the first only, which, properly speaking, is compressed by the flap; the two others being in the flap itself, are not compressed by it, but in it, by the apparatus.

As to the other advantages, that which Verduin supposes, by saying, that there is less danger of a mortification, does not appear to me well grounded; on the contrary, the compression of the flap ought to make it apprehended; whereas, in the ordinary method, it cannot be the consequence of the operation. What he says of the sympathetic pains, which are not felt, according to him, after the operation, is contrary both to experience and reason. In the first place, it contradicts experience; for, Ruysch informs us, that a patient, on whom this operation had been performed, was sensible of pain at the extremity of the arm, at the fingers, and at the amputated hand, when his stump was compressed; that when the stump was bent, he fancied that the fingers of the hand, which no longer existed, were bent also; and that, when they rubbed him above the articulation of the joint, and even at the side of the breast, he imagined that he felt his fingers. In the second place, it is contradictory to reason; for, the immediate cause of sympathetic pains, is the action of the nerves, which, after the amputation of a limb, is produced in the brain, in the same manner as it was before the amputation. Now let me ask, whether a flap, which is left, on making an amputation, can prevent this action from being produced, as it certainly would be, if no flap at all had been left. The advantages, therefore, of the new method, must be reduced to the four we have mentioned; and if we add to these the success it has met with, we must look on the invention of it as very useful in certain cases.

I have already spoken of two operations performed according to this method; and shall now relate three others, which have perfectly well succeeded. The first was in the hospital of Amsterdam, on a man thirty years old; the history of which is given by Verduin. The second was performed by Verduin's son-in-law, on a boy sixteen years old, who had a painful and ulcerous tumour in one of his hands.

This fact is related by Ruysch in one of his letters. Van Ulooten performed the third, on a man exceedingly lean, who had a spina ventosa. The leanness of the patient made it necessary to begin the incision, by which the flap was to be formed, at the tendo achilles. He did not lose three ounces of blood. The tourniquet was left on him till the nineteenth day, and the wound dressed like a simple one. The flap, which, at first, greatly exceeded the surface of the stump, retired four fingers breadth, towards the end of the cure. This is related in a letter which Verduin has inserted in his treatise of operations. To these instances, must be added those produced by Loudham and Verduin. I say nothing here of those operations which have been performed by Garengeot, as he himself has promised us a detail of them.

Such has been the progress of art, with regard to amputation, ever since the invention of the new method of Verduin and Sabourin, till the year 1739, when Ravaton, surgeon-major of the hospital of Landau; and afterwards M. Vermale, seriously reflecting on the ordinary method of amputating limbs, especially the thigh, each of them proposed to the French Academy a kind of amputation with the double incision, different from the method of Verduin and Sabourin. Instead of preserving only one flap, as these practised, they advise the forming of two flaps; that the bone should afterwards be sawn, a ligature made on the vessels, and the two flaps applied, in order to procure their speedy re-union, and prevent the exfoliation of the bone, and too copious a suppuration.

However, there is some difference in their method of forming these two flaps. Ravaton makes three deep incisions down to the bone; first, a circular one, with a crooked knife, within four fingers breadth of the bone intended to be sawn; he afterwards makes, with a knife somewhat larger, the two others perpendicularly on the first, beginning at the place where the limb is separated, the one at the fore part, and the other at the hinder; and taking care not to touch the principal vessels; he detaches, in fine, the two flaps from the bone.

Vermale makes only two incisions, to form the two flaps. His dimensions must be taken very exactly. When he has fixed the tourniquet, as it ought to be in all amputations, he surrounds the part with two red threads, at the distance of four fingers breadth from each other; one at the place where the bone is to be sawn; the other at the place where the incision of the flaps is finished. He afterwards directs, to the fore part of the limb, the point of a bistoury, seven inches long, which he thrusts down to the bone: he makes it turn round the circumference, that it may come out by the opposite part; then directing the edge of the knife along the bone, he cuts down to the inferior thread, where he separates the first flap, which, by this incision, is made, as the author says, of a round or conic figure at the extremity. He makes, in fine, in the same manner, the second flap on the interior side of the part, in case he has begun by the exterior side, and *vice versâ*.

Ravaton and Vermale both finish their operation in the same manner. They raise the flaps, and sustain them, when thus raised, by means of the slit compress; they cut away the rest of the flesh, and separate the periosteum, as usual. They recommend the sawing of the bone with a saw, whose teeth must be fine. They make a ligature on the vessels; let the strings hang by that part of the wound, which has the greatest declivity, draw the flaps together, and secure them by languettes or cross-cloths (at the extremity of which there is spread a sticking plaster), and by an apparatus, which may be easily conceived.

The manner of M. Vermale's forming the flaps appears to me, continues La Faye, to have the advantage over that of M. Ravaton; but, instead of the straight bistoury, which M. Vermale makes use of, I would have one employed that is longer, and at the same time a little incurvated on its flat, that it may the better lay hold on the convexity of the bone, and run over it more easily than can be done by the straight bistoury.

This method is less tedious and less painful, from the manner of forming the flaps; and they are hereby more exactly applied to each other, because the skin and flesh are cut in such a manner, as to facilitate their adjustment: they must also be more speedily re-united, than if they had been formed after M. Ravaton's method; which is an improvement of his manner of amputation, by preserving two flaps. But, at the same time, it must be acknowledged, that it is difficult, if not impossible, to cover exactly, by means of two flaps, the bones of the leg, after they have been sawn; and that, on the contrary, this may be perfectly well done with one flap only. The method of M. Verduin has this further advantage, that it may be practised on the thigh, the fore-arm, and the arm, in all cases; but especially when one of the sides, which should be preserved for forming the two flaps, has undergone any alteration. So that, I think, proceeds La Faye, we shall always be greatly obliged to Verduin and Sabourin, for what they have invented; and, that those, who shall do their endeavour to bring it to perfection, will not have lost their time. This

is what has induced me to attempt to remedy some defects, which I find in the first and second apparatus of both their methods.

The laying on of the first, appears to me extremely embarrassing. I know not whether it is easy to obtain, with a slip of leather, the just degree of compression which ought to be made on the vessels.

The instrument, which Verduin calls soutien, and is employed by him in the second, must compress the stump, by means of the plate. In order to make the compression properly, it must have a fixed point; the plate, it is true, has one, with respect to the sheath, and to the goutiere or hollow; but, says La Faye, I do not see, that the goutiere has any. To remedy this inconvenience, I have contrived an instrument composed of three pieces, namely, of a goutiere or hollow of tin, pretty much like that of the soutien of Verduin; of a plate, of the same metal, made a little concave; and of a screw.

The goutiere or hollow, in which the thigh is placed, is furnished with a cushion; it is fastened by three leather straps, every one of which has a buckle, to a very broad belt, of the same kind, which goes round the body, near as high as the os ileum, and is maintained *in situ*, by a buckle. Each of the leather straps passes through an aperture, or flat ring, formed in that part of the goutiere, which regards the top of the thigh.

The plate has two parts: the first is round, and something concave, and applied on the surface of the stump: the second makes a long square, whereon the hinder part of the stump rests, which, together with the thigh, must form an angle somewhat obtuse. Each of these parts is likewise furnished with a cushion.

The screw is placed in a small frame of copper. This frame is composed of two parts, the one fixed, the other moveable. The fixed part, which is fastened by two screws to a little tin-plate, has, at the extremity, which is towards the goutiere, an hinge or joint with five knuckles, and two segments of a circle, which run the one on the other. One of these segments has an opening to permit the motion of the hinge, and to fix it at one's pleasure, by means of a screw, which passes through the slit, and is wormed on the other part. The end of the hinge is joined to the goutiere by means of two screws.

On the fixed frame, which is made sloping at top, and chamfered on its inner part, in the form of an half swallow's-tail, are placed two small cross-pieces tapped, which serve as a nut to the screw, and are each of them fastened by two other small screws.

The moveable frame rises to a square, or right angle, being fastened with two wormed screws to the round plate, which is made a little concave. It is composed of two parallel branches, and chamfered both within and without, to fill the two swallow-tails of the fixed frame, wherein it runs, as well as in the two cross pieces, which serve as a nut. The second part of the plate, which forms a long square, is applied on these two branches, and can run under another plate of the same breadth, to which the fixed frame is fastened.

At the angle of the square, is a round socket, wherein passes the square top of the screw, which is about four inches and an half in length. Beneath the socket, is a piece, which serves to direct the large screw, and is stopped under the square, by means of two screws, which pass through the part of the socket and the square, and are wormed in the part of this direction.

Before the operation is begun, M. Petit's tourniquet must be placed, and left on during the cure. After the operation is over, the flap, which has been preserved, is applied on the stump, and immediately sustained with two bandages of two fingers breadth, and covered at their extremities with a sticking plaster. These bandages must be laid cross-ways on the surface of the stump, and applied by their extremities on the sides. The instrument I am speaking of, continues La Faye, is then to be placed. The thigh must be put in the goutiere, there must be fastened round the body the broad belt, which is to make its fulcrum or point of support, by means of the three leather straps. The stump, being at the same time supported on the long square of the machine, the concave and round plate will make on its surface, which is covered by the flap, the necessary compression, by means of the screw, the use of which is, to graduate the compression, by putting the plate in action. The wound is to be covered with lint, and proper compresses. In fine, the tourniquet must be loosened, that the vessels may furnish as much blood as shall be requisite for the nourishment of the stump, and of the flap: but care must be taken to loosen it no more than may be necessary for this purpose. With this precaution, a moderate compression of the concave plate will be sufficient to stop the hemorrhage, and to prevent the dangers, to which a strong compression exposes the parts whereon it is made.

The description of the machine here proposed, suffices to give an idea of its advantages. In the first place, it has a fixed point. The plate is joined to the goutiere by an hinge, which is rendered immoveable, after it has been opened as much as may be judged convenient; and the goutiere has a fixed point, by means of the straps which are fastened to the leather

belt. Secondly, this instrument is made use of, after the operation is finished, and left on, during the whole course of the cure; so that there is here only one apparatus; whereas Verduin proposed two. Thirdly, we may easily see, from the beginning of the cure, the state of the wound, and dress it, without altering any thing in the compression. Fourthly, the round and concave plate does not only keep the flap fast on the extremity of the stump, but makes a gentle compression on it, just as strong as is necessary, and equal in every point. Fifthly, the machine which I propose, says La Faye, would be proper in this method of amputation, even were we to make a ligature on the vessels. (*Mem. de l'Acad. de Chirurgie, Tom. 5, Edit. in 12mo.*)

I shall now insert the observations published on this subject by Garengeot in the Mem. de l'Acad. de Chirurgie, Tom. 5. in 12mo.

MEMOIR BY M. DE GARENGEOT ON THE FLAP AMPUTATION.

It is about twenty years ago, that I performed, at Mantes, in presence of M. Quesnay, the flap amputation, according to the method of Verduin and Sabourin, on a mason, whose right leg and foot had been fractured. We know that they made no ligature on the vessels, and that their intention by this method was, that the flap, being applied on the stump, and sustained by a particular apparatus which they have described, should reunite itself to the stump, and thereby stop the hemorrhage.

The above mentioned patient, who was dangerously wounded in several other parts of his body, died on the third day after the operation; and though it cannot be absolutely said that this was owing to the hemorrhage, yet must it be allowed, that it had a considerable share in it.

As the multiplicity of machines described by the inventor, has no other end, but to contain the flap so near the orifice of the vessel, that they might be exactly compressed and closed up; my reflections on this head induced me to think, that, to obtain a just degree of this compression was very difficult, as the most considerable vessels are situated between the two bones, and all the vessels in general, when they are cut, withdraw themselves, so that it seems almost impossible that the flap should compress vessels thus retracted, and closed round with two extremities of bone. It was my opinion, therefore, that a stop ought to be put to the hemorrhage, by means of the ligature, which is always the surest expedient; and I resolved to practice it on the first occasion that offered, and at the same time, to do it in the simplest manner, so as to render the operation easy, that I might draw all possible advantages from it.

With this view it was, that I performed, twelve years after the operation I have been speaking of, the flap amputation of the arm, on a soldier of the king's regiment of infantry: but I preserved two flaps, according to the method communicated to the Academy by M. Ravaton. I made a ligature on the brachial artery, and left the thread in the inferior angle of the division. I omit giving a detail of the apparatus, and shall only observe, that the bone was exactly covered; that the patient was only dressed every two or three days; that the compresses were dipped sometimes in brandy, sometimes in sea-water, to stop the suppuration; that the ligature fell off the eighth day; and that, on the twenty-eighth, the patient was perfectly cured, without any exfoliation.

I made a third experiment of this operation on a soldier of the same regiment, dangerously wounded in the right foot by the bursting of a bomb, which fractured the inferior part of the two bones of the leg, and several of the foot.

I did not make the amputation of this leg till the eighth day after the wound, from the opinion I entertained that gunshot wounds, in general, when attended with fracture of the bones, produce a terrible disorder in the nervous system, whence commonly result the most fatal accidents; and that it is more prudent to wait till nature is restored, if I may use the expression, to her ordinary situation.

In this operation, I left only one single flap; but having reflected, that the too quick adhesion of this flap to the stump, might render the extraction of the ligature very difficult, I made use of a further precaution, which was as follows.

After having made the ligature of the vessels as usual, I cut the threads to the length of seven or eight fingers breadth; I surrounded them with a compress four times double, an inch broad, and of the same length as the threads. I applied one of the ends of this little long compress, between the two bones, on the vessels, which had been tied up, and the other end was placed on the side with the threads; after which I raised the flap, in order to adjust it to the stump, and then laid on, not the apparatus used by M. Verduin, but the common sort, or pretty nearly the same that is generally employed in the amputation of the leg; by which means, the method of cure becomes more simple, as I make no use of the machines invented by this author and M. La Faye.

I did not take off this apparatus till the fourth day; when I found the flap adherent, with a gentle heat. The longuette or small compress, which hindered the reunion of the flap, in that place alone which

it possessed, was simply humid. I drew it out with facility, on the eighth day after the operation; and as I found such resistance from the ligature, as made me presume that it would not fall off so soon as I expected, I cut it in the loop with blunt scissars, which were directed into the space of the sinus formed by the presence of the compress. I afterwards joined it together again, by applying an apparatus like that which had been put on, at the instant of the operation. I did not remove it till three days after, and saw with pleasure the flap firmly reunited, though a portion of it had been applied on the linen for eight days.

The patient was cured on the twenty-seventh day of the operation, and could easily bend and stretch out the extremity which remained of the leg.

I am not insensible, that some surgeon-majors of this regiment have performed this operation; but by following Verduin's method too exactly, it has proved unsuccessful. I am persuaded that the alterations I have already made in it, are of some consequence, and I should still add more, did I see any occasion for making them.

What I have experienced in my third patient, would induce me to make the ligature, in such a manner, that it might exactly embrace, if I may use the term, no more than the vessel, in order to its falling off more speedily, and sooner re-uniting the flap.

I am still of opinion, that if the ligature should not fall off, so soon as we apprehend it has produced its effect, it would be necessary to cut it; because its too long continuance must naturally obstruct the advantages proposed from this operation, with regard to the speedy re-union. But as it is not very easy to cut the ligature very close, I should make use, in preference to other remedies, of the agaric of oak, whose success is well known. Two pieces of this fungus, each fastened by a string, (to one of which there should be made a knot to distinguish them) being afterwards applied, the one on the other, to the orifice of the vessels, and the two strings covered by the long compress above-mentioned, would certainly stop the hemorrhage: the whole being withdrawn in the space of three days, there would need no more than the same space for the whole flap's adhering to the stump, and the cure would be perfectly completed in a short time after.

As to what remains to be said on this subject, although I am convinced, says Garengeot, that the method of amputation with a flap, has some advantages, which the others have not; it is not my present design to examine into the reasons of the preference, but only to deliver what has occurred to me on this head, and to propose such alterations as I thought, might render the operation more perfect. (*M. de Garengeot, in Mémoires de l'Acad. de Chirurgie, Tom. 5, in* 12*mo.*)

SUBJECT OF AMPUTATION WITH A FLAP CONCLUDED.

We have already spoken of the flap-operation having been done by White and Bromfield above the ankle. In the year 1765, Sylvester O'Halloran, an eminent surgeon, of Limerick in Ireland, published a revival of the flap-amputation, upon a plan entirely new. However, his fault consisted in not putting the flap in contact with the wound, till after inflammation had subsided, about the twelfth day.

Messrs. Alanson and Lucas conjectured that the cure might be rendered more safe, easy, and expeditious, by applying the flap, with a view of uniting it by the first intention.

The following case explains Mr. Alanson's flap-operation. The disease was in the left leg, the patient, therefore, lay on his right side, upon a table of convenient height, so as to turn the part to be first cut fully into view. The intended line, where the knife was to pass in forming the flap, had been previously marked out with ink. A longitudinal incision was made with a common scalpel, about the middle of the side of the leg; first on the outside, then on the inside, and across the tendo Achillis: hence, the intended flap was formed, first by incisions through the skin and adipose membrane, and then completed, by pushing a catling through the muscular parts in the upper incised point, and afterwards carrying it out below, in the direction of the line already mentioned. Thus the whole flap was completed. The flap was thick, containing the whole substance of the tendo Achillis. The usual double incision was made; the retractor applied to defend the soft parts; and the bone divided, as high as possible, with the saw.

The flap was placed in contact with the naked stump, and retained there, at first by three superficial stitches, between which adhesive plasters were used. Notwithstanding the patient caught an infectious fever, a few days afterwards, the stump healed in three weeks, except half an inch at the inner angle, where the principal vent had been. In another week, the wound was reduced to a spongy substance, about the size of a split-pea. This being touched with caustic healed in a few days. The man was soon able to use an artificial leg, with which he walked remarkably well. He went several voyages to sea, and did his business with great activity. He bore the pressure of the machine totally upon the end of the stump, and was

not troubled with the least excoriation or soreness.

In the next instance, in which Mr. Alanson operated, he formed the flap by pushing a double-edged knife through the leg, and, passing it downwards and then outwards, in a line, first marked out for the direction of the knife. In this way, the flap was made more quickly. (*Alanson on Amputation.*)

The leg should be completely extended during the operation; and kept in that posture, till the wound is perfectly healed.

We shall next notice Mr. Hey's method. This gentleman is satisfied, that very near the ankle, is not the most proper place for this kind of amputation.

Some cases occurring, in which, from a scrophulous habit, the wound at the stump would not heal completely, nor remain healed, Mr. Hey determined to try, whether amputation in a more muscular part would not secure a complete healing, and give the patient an opportunity of resting his knee on the common wooden leg, or using a socket, as he might find most convenient. Mr. Hey now prefers this method, and has reduced it to certain measures.

It had been customary, at the Leeds Infirmary, to make the length of the flap equal to one-third of the circumference of the leg. This was determined by the eye of the operator, who usually pushed the catling through the leg, near the posterior part of the fibula. Mr. Hey, finding the flap was not always of the proper breadth began to determine this by measure, and now operates as follows: to ascertain the place where the bones are to be sawn, together with the length and breadth of the flap, he draws upon the limb five lines, three circular, and two longitudinal ones. He first measures the length of the leg from the highest part of the tibia to the middle of the inferior protuberance of the fibula. At the mid-point, between the knee and ankle, he makes the first or highest circular mark upon the leg. Here the bones are to be sawn. Here Mr. Hey also measures the circumference of the leg, and thence determines the length and breadth of the flap, each of which is to be equal to one-third of the circumference. In measuring the circumference of the limb, Mr. Hey employs a piece of marked tape, or ribbon, and places one end of it on the front edge of the tibia. Supposing the circumference to be twelve inches, he makes a dot in the circular mark on each side of the leg, four inches from the anterior edge of the tibia. These dots must, of course, be four inches apart behind. From each of these dots Mr. Hey draws a straight line downwards, four inches in length, and parallel to the front edge of the tibia. These lines shew the direction, which the catling is to take in making the flap. At the termination of these lines, Mr. Hey makes a second mark round the limb, to shew the place where the flap is to end. Lastly, a third circular mark is to be made an inch below the upper one, first made, for the purpose of directing the circular cut through the integuments, in front of the limb. The catling, for making the flap, should be longer than those commonly employed in amputations. Mr. Hey uses one which is seven inches long in the blade, and blunt at the back, to avoid making any longitudinal wound of the arteries, which is very difficult to close with a ligature, and, for the same reason, he pushes the catling through the leg a little below the place where such muscles are to be divided, as are not included in the flap. The limb being nearly horizontal, and the fibula upward, he pushes the catling through the leg, where the dot was made, and carries it downward along the longitudinal mark, till it approaches the lowest circular mark, a little below which the instrument is brought out. The flap being held back, Mr. Hey divides the integuments on the front of the limb along the course of the second circular mark. The muscles not included in the flap, are then divided a little below the place where the bones are to be sawn. No great quantity of these muscles can be saved, nor is it necessary, as the flap contains a sufficient portion of the gastrocnemius and soleus muscles to make a cushion for the end of the bones. After sawing the bones, Mr. Hey advises a little of the end of the tendon of the gastrocnemius to be cut off, as it is apt to project beyond the skin, when the flap is put down; and he recommends the large crural nerve, when found on the inner surface of the flap, to be dissected out, lest it should suffer compression.

As strips of adhesive plaster cause great pressure on the end of the stump, Mr. Hey prefers using sutures for keeping the flap applied. Small strips of court plaster are to be put between the ligatures. The sutures may be cut out on the eighth or ninth day, and the flap supported by plasters.

Mr. Charles Bell describes another sort of flap-amputation. The operation is not to be done so low, as there will not be a sufficiency of muscle to cover the end of the bones. An oblique cut is to be made with the large amputating knife, upward, through the skin of the back part of the leg. The assistant is to draw up the skin, and the knife is to be again applied to the upper margin of the wound, and carried obliquely upward till it reaches the bones. The knife, without being withdrawn, is next to be carried, in a circular direction, over the tibia and fascia,

covering the tibialis anticus, until it meets the angle of the first incision on the outside of the limb. The surgeon is then to pierce the interrosseous membrane, &c. The sawing being completed, and the arteries secured, the flap is to be laid down, and the integuments of the two sides of the wound will be found to meet. (See *Bell's Operative Surgery, Vol.* 1.)

The flap-amputation is certainly more painful than the common method, and, though it has had very able men for its patrons, it is questionable, whether it is productive of the smallest advantage. Nor is there any necessity for adopting this kind of operation, though you may choose to amputate near the ankle. Mr. Lucas (*Med. Obs. and Inq. Vol.* 5.) does indeed endeavour to prove, that the stump will not bear the pressure of a machine for walking unless a flap be preserved. However, as the author of the article *Amputation*, in the *Encyclop. Méthod.* remarks, if care be taken to save muscle, a machine for walking may be worn as conveniently as if a flap had been made.

The flap-amputation of the thigh is now quite abandoned by all the best surgeons in this country, and no description of it seems necessary. Foreign surgeons, however, seem not to have entirely rejected this way of operating. We read in Desault's works, by Bichat, that the former was in the habit of adopting this kind of amputation; but, it is a justice due to the eminent M. Sabatier, to state his disapprobation of the practice. (*Médecine Opératoire, Tom.* 3, *p.* 257.)

Some criticisms on the flap-amputation, by the intelligent M. Louis, will be found among the observations, which I have taken from the valuable writings of that eminent surgeon, and inserted at the end of the present article.

AMPUTATION OF THE ARM.

The structure of the arm is very analogous to that of the thigh; like the latter, it contains only one bone, round which the muscles are arranged. The interior ones are attached to the os brachii, while the more superficial ones extend along the limb, without being at all adherent. The first consist of the brachialis internus, and the two short heads of the triceps; the second, of the biceps, and long head of the triceps. Hence, amputation is here to be done in the same way as in the thigh, unless when we are necessitated to amputate very high up, above the insertion of the deltoid muscle.

The patient being properly seated, the arm is to be raised from the side, and, if the disease will allow it, into a horizontal position. The surgeon is to stand on the outside of the limb, apply the tourniquet as high as possible, and to have the skin and muscles which he is about to divide, made tense, by the hands of an assistant. The soft parts are next to be divided, as much of the limb being preserved as possible. The bone is to be sawn with the usual precautions, and the bleeding stopped in the usual way. The stump is then to be dressed, and the patient put to bed, with the wound a little elevated from the surface of the bedding.

If the disease should require the arm to be taken off at its upper part, there would be no room for the application of the tourniquet. A compress might then be put in the axilla, and compressed by any strong bystander. With a straight bistoury, the surgeon is now to make a transverse incision down to the bone, a little above the lower extremity of the deltoid muscle. Two other longitudinal incisions, made along the front and back edge of this muscle, would form a flap, which must be detached and reflected. Lastly, the rest of the soft parts of the limb are to be divided by a circular cut, made on a level with the base of the flap. (*Sabatier Médecine Opératoire, Tom.* 3, *p.* 242, 243.)

With regard to placing a compress on the artery in the axilla, as advised by Sabatier, this is not so eligible, as making pressure on the artery, as it passes over the first rib, and of which method we shall speak when we treat of amputation at the shoulder.

AMPUTATION OF THE FOREARM.

The wisest maxim, with respect to the place for making the incision, is to cut off as little of the limb as possible. The forearm is to be held by two assistants, one of whom is to take hold of the elbow, the other of the wrist. The tourniquet is to be applied to the lower part of the arm, and the assistant, holding the elbow, should draw up the integuments, so as to make them tense. The circular incision is then to be made down to the fascia; from this as much skin is to be detached, reflected, and saved, as is necessary for covering the ends of the bones, and the muscles are to be cut on a level with the reflected skin, at the same time directing the knife obliquely upward. As many of them are deeply situated between the two bones of the forearm, too much attention cannot be paid to dividing all of them, with a double-edged knife introduced between the radius and ulna.

The soft parts are to be protected from the saw by a linen retractor. It is generally recommended to saw the two bones together, for which purpose the forearm should be placed in the utmost state of

pronation. In any other position, the ulna is situated almost directly under the radius.

The ulnar, radial, and two interosseous arteries, are those, which usually require a ligature.

AMPUTATION AT THE HIP-JOINT.

The French Academy of Surgery proposed the following question in 1736, as the grand prize subject: *In the case, in which amputation of the hip-joint should appear to be the only resource for saving the patient's life, to determine whether this operation ought to be practised, and what would be the best way of performing it?* No satisfactory memoirs having been presented, the same subject was proposed in 1759. The approbation of the academy was now conferred on a paper, in which the possibility of amputating at the hip-joint was established. The cases, demanding the operation, are also determined by Barbet, the author. If, for instance, a cannon ball, or any other violently contusing cause, should have carried off or crushed the thigh, so as only to leave a few parts to be cut to make the separation complete, we ought not to hesitate about doing it. A sphacelus, extending to the circumference of the joint, and destroying the greatest part of the surrounding flesh, might render the operation equally necessary and easy. (See *Sabatier, Tom.* 3, *p.* 271, *&c.*) Cases are adduced of the limb being taken off, by the surgeon completing the separation of the dead parts with a knife. However, this cannot be considered as amputation at the hip-joint. Dividing a few dead fibres was a thing of no importance, in regard to the likelihood of its creating any bad symptoms. The proceeding, in fact, seems to me to have no analogy at all to the bloody operation of taking the thigh bone out of the socket. I cannot conceive any case, in which the circumstances, however perilous, would be at all improved by this operation. The following are Mr. Pott's sentiments: "M. Bilguer, and M. Tissot, are the only people whom I have met with, or heard of, in the profession, who speak of an amputation in the joint of the hip, as an advisable thing, or as being preferable to the same operation in the thigh." After a quotation or two, he continues; "that amputation in the joint of the hip is not an impracticable operation (although it be a dreadful one) I very well know. I cannot say, that I have ever done it, but I have seen it done, and am now very sure I shall never do it, unless it be on a dead body. The parallel, which is drawn between this operation and that in the shoulder will not hold. In the latter it sometimes happens, that the caries is confined to the head of the os humeri, and that the scapula is perfectly sound and unaffected. In the case of a carious hip-joint, this never is the fact; the acetabulum ischii, and parts about, are always, more or less in the same state, or at least in a distempered one, and so indeed most frequently are the parts within the pelvis, a circumstance this of the greatest consequence; for the power of performing the operation beyond the seat of the disease, and, consequently, of totally removing all the distempered parts, is the very decisive circumstance in favour of amputation every where, but, in the hip, where (to say nothing of the horridness of the operation itself) the hemorrhage, from a multiplicity of vessels, some of which are of considerable size, and the immense discharge which a sore of such dimensions must furnish, the distempered state of the parts, which cannot by the operation be removed, will render it ineffectual, bold and bloody as it must be." (*Pott on Amputation.*)

This dreadful operation was performed in this country, some years ago, by Dr. Kerr, of Northampton. (See *Duncan's Med. Commentaries, Vol.* 6, *p.* 337.) M. Larrey informs us, that he has performed it three times; twice in Egypt, and once, while he was surgeon to the French army on the Rhine. One of his patients survived the operation a week, at the end of which he was carried off by the plague; and the others died, after being conveyed, in a very uneasy manner, during a precipitate march of the army. (See *Relation de l'Expédition de l'Armée d'Orient en Egypte, &c.*) For my own part, with all the respect, which I entertain for this judicious surgeon, I cannot conceive any circumstances, in which a patient would be benefited by so severe an operation. Were the upper portion of the thigh bone the only part diseased, or were it and the adjacent part of the pelvis splintered by a gun-shot injury, I should rather listen to the suggestion of Mr. Charles White, of Manchester, and endeavour to perform the excision of the diseased, or splintered parts, than have recourse to amputation at the hip, an operation, however, which, as we have seen, has the sanction of authority.

AMPUTATION AT THE SHOULDER JOINT.

The first description of this is to be found in *Le Dran's Observations.* His father, it seems, undertook the operation, in a case of caries conjoined with exostosis, which affection reached from the middle to the neck of the humerus. He began with rendering himself master of the bleeding, by introducing a straight needle, armed with a strong ligature,

doubled several times. This was passed from the front to the back part of the arm, as closely to the axilla and bone as possible. The ligature, including the vessels, the flesh surrounding them, and the skin covering them, was tightened over a compress. Then Le Dran, with a straight narrow knife made a transverse incision through the skin and deltoid muscle down to the joint, and through the ligament surrounding the head of the humerus. An assistant raised the arm, and dislocated the head of the bone from the cavity of the scapula. This allowed the knife to be passed with ease between the bone and the flesh. Le Dran then introduced the knife downward, keeping its edge continually somewhat inclined towards the bone. In this manner, he gradually cut through all the parts, as far as a little below the ligature. As there was a large flap, Le Dran made a second ligature with a curved needle, which ligature included a great deal of flesh, the redundant portion of which was cut off together with the first ligature, which had become useless. The cure was completed in about ten weeks. Le Dran (the son) does not state, that the operation was a new one, and it appears, from the *Récherches Critiques sur l'origine, &c. de la Chirurgie en France*, and from La Faye's notes on Dionis, that it had been previously practised by Morand the father.

Garengeot thought a curved needle, with sharp edges, would be better for making the first ligature, and that the wound need not be so large, if the incision were to begin two or three finger-breadths from the acromion, and made so as to form two flaps, the lower one of which would correspond to the axilla, and might be brought into contact with the other, after the second ligature was applied.

La Faye extended the improvements further. After placing the patient in a chair, and bringing the arm into a horizontal position, he made, with a common bistoury a transverse incision into the deltoid muscle down to the bone, four finger-breadths below the acromion. Two other incisions, one in front, the other behind, descended perpendicularly to this first, and made a large flap of the figure of a trapezium, which was detached and turned up towards the top of the shoulder. The two heads of the biceps, the tendons of the supra-spinatus, infra-spinatus, teres minor and subscapularis, and the capsular ligament, were next divided. The head of the humerus could now be easily dislocated, when the assistant, who held the lower part of the limb, made the bone describe the motion of a lever upward. La Faye next carried his incisions downward, along the inner part of the arm, until he was able to feel the vessels, which he tied as near the axilla as possible. Then he completed the separation of the limb, one finger-breadth lower down. All remaining to be done, was to bring down the flap over the glenoid cavity, and dress the wound. (See *Nouvelle Méthode pour faire l'Opération de l'Amputation dans l'articulation du Bras avec l'Omoplate, par M. La Faye, in Mém. de l'Acad. de Chirurgie, Tom. 5, p.* 195, *Edit. in* 12*mo.*

The advantages of this plan are obvious. As only one ligature is applied, the patient is saved a great deal of pain; the flap, which is connected with the acromion, is more easily applied and kept on the stump, than the one, which Garengeot recommended to be made, at the lower part of the axilla. Lastly, any discharge can readily find vent downward.

Mr. Samuel Sharp recommended the following plan. "The patient's arm being held horizontally, make an incision through the membrana adiposa, from the upper part of the shoulder across the pectoral muscle, down to the arm-pit, then turning the knife with its edge upwards, divide that muscle and part of the deltoid, all which may be done without danger of wounding the great vessels, which will become exposed by these openings. If they be not, cut still more of the deltoid muscle, and carry the arm backward. Then with a strong ligature, having tied the artery and vein, pursue the circular incision through the joint, and carefully divide the vessels at a considerable distance below the ligature; the other small vessels are to be stopped, as in other cases.

"In doing this operation, regard should be had to the saving as much skin as possible, and to the situation of the processus acromion, which, projecting considerably beyond the joint, an unwary operator would be apt to cut upon." (*Operations of Surgery.*)

Bromfield's plan consisted in first exposing the axillary vessels, by dividing the integuments in the axilla. These vessels he detached, and tied. Then having cut the capsular ligament with scissars, he finished the operation on Mr. Sharp's plan.

At length, P. H. Dahl, in 1760, published at Goettingen, a Latin dissertation on amputation at the shoulder, in which publication he propos s making one's self master of the blood, before the operation, by a tourniquet, the pad of which pressed on the subclavian artery under the clavicle. This enabled the operator to dispense with tying the vessels in the first instance. Camper had observed, that if we push the scapula backward, and press the axillary artery with the finger between the clavicle, coracoid process, and great

pectoral muscle, the pulse at the wrist instantly stops.

Dahl's tourniquet was obviously constructed, in consequence of what Camper had observed, and it consists of a curved, elastic plate of steel, the length of which may be readily imagined. A pad is attached to the shortest end of this plate, and is made capable of projecting further by means of a screw. The instrument is applied by making it embrace the shoulder from behind forward, while the pad presses on the hollow under the clavicle, between the margins of the deltoid and pectoral muscles. The long extremity of the steel plate, which descends behind the shoulder, is to be fixed to the body by a sort of belt. The pad is then to be depressed, until the pulsation of the axillary artery is stopped.

Further experiments have proved, however, that this tourniquet may be dispensed with, and the flow of blood in the axillary artery commanded, by properly compressing this vessel with a pad, at the place where it emerges from between the scaleni muscles, above the middle part of the clavicle. Thus the artery becomes pressed between the pad and the first rib, across which it runs. This method, which is as simple as possible, is preferable to that, which requires a tourniquet that is so seldom at hand.

Amputation at the shoulder has been in some degree superseded by a preferable operation, even in cases in which it would formerly have been deemed quite indispensable, such as considerable gun-shot fractures of the head of the humerus; a caries of the substance of this part, &c. Boucher, in *Tom.* 2, *Mem. de l'Acad. de Chir.* shews, that considerable wounds, extending into the shoulder joint, were capable of being successfully treated, by extracting the pieces of bone, which had been separated by violence. Instances are also recorded, in which, when the head and neck of the humerus had been totally disunited from the body of that bone, a cure was accomplished by making such incisions as allowed the portions of bone, now become extraneous bodies, to be taken away. Mr. White, of Manchester, proceeded further, and ventured to make a deep incision at the upper part of the arm, to dislocate the head of the humerus, which he knew was carious, and, pushing it through the wound, took it off with a saw.

"Edmund Pollit, of Sterling, near Cockey-Moor, in this county, (Lancashire) aged fourteen, of a scrofulous habit of body, was admitted into the Manchester Infirmary, April 6, 1768. The account I received with him was, that he had been suddenly seized, about a fortnight before, with a violent inflammation in his left shoulder, which threatened a mortification, but at last terminated in a large abscess, which was opened with a lancet a few days before his admission. The orifice was situated near the axilla, upon the lower edge of the pectoralis major, and through it I could distinctly feel the head of the os humeri, totally divested of its bursal ligament. The matter, which was very offensive, and in great quantity, had made its way down to the middle of the humerus, and had likewise burst out at another orifice, just below the processus acromion, through which the head of the os humeri might easily be seen. The whole arm and hand were swelled to twice their natural size, and were intirely useless to him. He suffered much pain, and the absorption of the matter had brought on hectic symptoms, such as night sweats, diarrhœa, quick pulse, and loss of appetite, which had extremely emaciated him.

"In these very dangerous circumstances there seemed to be no resource but from an operation. The common one in these cases, that of taking off the arm at the articulation, with the scapula, appeared dreadful, both in the first instance, and in its consequences. I therefore proposed the following operation, from which I expected many advantages, and performed it on the fourteenth of the same month. I began my incision at that orifice which was situated just below the processus acromion, and carried it down to the middle of the humerus, by which all the subjacent bone was brought into view. I then took hold of the patient's elbow, and easily forced the upper head of the humerus out of its socket, and brought it so entirely out of the wound, that I readily grasped the whole head in my left hand, and held it there till I had sawn it off, with a common amputation saw, having first applied a pastebord card betwixt the bone and the skin. I had taken the precaution of placing an assistant, on whom I could depend, with a compress just above the clavicle, to stop the circulation in the artery, if I should have the misfortune to cut or lacerate it, but no accident of any kind happened, and the patient did not lose more than two ounces of blood, only a small artery which partly surrounds the joint being wounded, which was easily secured.

"He was remarkably easy after the operation, and rested well that night; the discharge diminished every day, the swelling gradually abated, his appetite returned, and all his hectic symptoms vanished. In about five or six weeks I perceived the part from which the bone had been taken, had acquired a considerable degree of firmness, and he was able to lift a pretty large weight in his hand. At

the end of two months I found that a large piece of the whole substance of the bone that had been denuded by the matter, and afterwards exposed to the air, was now ready to separate from the sound, and with a pair of forceps I easily removed it. After this exfoliation the wound healed very fast, and on August 15, he was discharged perfectly cured. On comparing this arm with the other, it is not quite an inch shorter; he has the perfect use of it, and can not only elevate his arm to any height, but can likewise perform the rotatory motion as well as ever. The figure of the arm is no ways altered, and from the use he has of it, and its appearance to the eye and to the touch, I think I may safely say the head, neck, and part of the body of the os humeri are actually regenerated.

"I did not make use of any splints, machine, or bandage, during the cure, to confine the limb strictly in one certain situation, nor was his arm ever dressed in bed, but sitting in a chair, and as soon as he could bear it, standing up with his body leaning forwards, to give room for the application of the bandages, which were no more than what was just necessary to retain the dressings; and to this method I attribute the preservation of the motion of the joint, which could not have been so well effected any other way, as the joint would in all probability have remained stiff, and formed an anchylosis, if it had not been allowed to play about.

"Though from this operation I hoped for many advantages preferable to the amputation of the limb at the scapula, yet my most sanguine expectations fell greatly short of the success attending it. I did not flatter myself with the hopes of a moveable joint, or that the length of the limb would be so nearly preserved, where there was a loss of above four inches of the whole substance of the bone, without any other bone to support it, as in the leg and forearm, and where the dreadful condition of the arm, at the time of the operation, prevented me from making use of any machine to keep it extended*. But I suppose the weight of the arm was in this case in some measure sufficient to counterbalance the contractile power of the muscles, as his arm was only suspended by a common sling, and the patient not at all confined to his bed. I could not help being surprized to find so much strength and firmness, as evidently shewed a regeneration of the bone, before the lower part had exfoliated, or even before it had begun to loosen. The osseous matter could not proceed from the scapula, the glenoid cavity of that bone not being divested of its cartilage, could it then possibly escape from the end of the sound bone, before the morbid part had begun to separate from it? Or are there any vessels that could convey the bony matter, and deposit it in the place of what had been removed*?

"These are points that I will not pretend to decide absolutely, but I am much inclined to the latter opinion. Is it not probable that there was a regeneration of the cartilage as well as of the bone? It is well known to every body conversant in anatomy, that not only the ends of some bones, which are joined to no others, are covered with cartilages, but that they are never wanting on the ends, and in the jointed cavities of such bones as are designed for motion, and I cannot see in this case how the motion could be preserved so complete without a cartilage; and indeed without a bursal ligament, or something analogous to it, to contain the synovia, and keep the bone in its place.

"As this is the first operation of the kind that has been performed, or at least made public, I thought the relation of it might possibly conduce to the improvement of the art. That ingenious surgeon, Mr. Gooch, has indeed related three instances of the heads of bones being sawn off in compound luxations. In one of

* After the extraction of three inches and ten lines of the os humeri, M. Le Cat made use of a machine to keep the upper and lower pieces of the bone at their proper distances. He has given a description of the case, and a figure of the machine in vol. 56 of the Philos. Trans. p. 270.

* Mr. Gooch, in his volume of cases and practical remarks, relating the case of a compound fracture of the leg, where a very considerable portion of the tibia was sawn off, says, "In about three weeks I was sensible, as were also several surgeons, whom curiosity led to see so uncommon a case, that the substance which grew in the space of five inches entirely void of bone, had acquired in the middle only a greater degree of solidity than flesh, which circumstance not agreeing with the generally received notion of the generation of callus, we proved, beyond dispute, with a sharp pointed instrument; and we observed that the ossification was gradually formed from that central point, which was considerably advanced before any exfoliation was cast off the ends of the divided bone. In less than four months the whole space was so well supplied with the callus, or rather new bone, that he was able to raise his leg, when the bandage was off, without its bending." (*Cases and Remarks, new edit. p.* 287.)

these cases the lower heads of the tibia and fibula were sawn off, and in another that of the radius, and in the third that of the second bone of the thumb, but these were in many respects different from the present case. I believe it will seldom happen that this operation will not be greatly preferable to the amputation of the arm at the scapula, as this last is generally performed for a caries of the upper head of the os humeri, and as the preservation of a limb is always of the utmost consequence, and what every surgeon of the least humanity would at all times wish for, but particularly where, as in this case, the whole limb, and its actions, are preserved entire, the cure no ways protracted, and the danger of the operation most undoubtedly less. For though amputation is often indispensably necessary, and frequently attended with little danger or inconvenience when only part of a limb is removed, yet where the whole is lost, the danger is greatly increased, and the loss irreparable.

"I had frequently performed this operation upon dead subjects, and where the parts had not been diseased, and never found any difficulty; and from a dissection of the parts had no reason to doubt of success in a living subject, where the ligaments and muscles are more supple, and the matter, by insinuating itself betwixt the bone and integuments, has made less dissection necessary. I have likewise, in a dead subject, made an incision on the external side of the hip joint, and continued it down below the great trochanter, when, cutting through the bursal ligament, and bringing the knee inwards, the upper head of the os femoris hath been forced out of its socket, and easily sawn off; and I have no doubt but this operation might be performed upon a living subject with great prospect of success.

"The Royal Academy of Surgery at Paris, proposed for a prize question, whether amputation of the thigh, at its articulation with the os innominatum, was ever advisable; but, was I under a necessity of performing this operation, or that which I have been describing, I should not hesitate a moment which to prefer.

"I had the honour of shewing to the Royal Society the bones which were taken from the boy's arm, at the time this paper was read, and they are now deposited in their museum." (*Cases in Surgery, with Remarks by Charles White, F.R.S. p.* 57.)

Bent, of Newcastle, has inserted a similar case in the 64th Vol. of the Philosophical Transactions. White made only one incision, from the vicinity of the acromion down to the middle of the arm. Bent, not being able to get at the head of the bone, through the wound, which he had made from the clavicle to the attachment of the pectoral muscle, detached a portion of the deltoid, where it is connected with the clavicle, and another part, where it is adherent to the humerus. Sabatier has proposed making two cuts at the upper part of the arm, which meet below like the letter V, extirpating the flap, dividing the inner head of the biceps, and capsular ligament; dislocating the head of the bone, and sawing it off. (*Médecine Opératoire. Tom.* 3.)

I think the cases, recorded by White and Bent, are truly important, inasmuch as they appear to have been the earliest models of a practice, which promises in a great measure to supersede all occasion for one of the most formidable and mutilating operations of surgery. To military and naval surgeons, these cases cannot fail to be highly interesting, as they must have frequent opportunities of availing themselves of the instruction, which they afford. M. Larrey, who was surgeon general to the French army in Egypt, employed the practice, with the greatest success, in cases of gunshot wounds. He thereby saved limbs, which, according to ordinary precepts and opinions, would have been a just ground for amputating at the shoulder; and, when we consider not only that a most dangerous operation is avoided, but that an upper extremity is saved, for which no substitute can be applied, we must allow, that the plan, first suggested and practised by Mr. White, cannot be too highly appreciated. When the arm is fractured near its upper extremity by a musket ball, it is considered by most surgeons necessary to amputate the limb, and, in such cases, the operation used invariably to be performed; but, says M. Larrey, "I have had the good fortune, on ten different occasions, to supersede the necessity for the operation, by the complete and immediate extraction of the head of the humerus, and of the splinters. I perform the operation in the following manner: I make an incision in the centre of the deltoid muscle, and parallel to its fibres, carrying the incision as low down as possible. I get the edges of the wound drawn asunder, in order to lay bare the articulation, of which the capsule is generally opened by the first incision, and by means of a probe pointed bistoury, I detach with the greatest ease from their insertions the tendons of the supra and infra spinati, of the teres minor, of the infra scapular, and of the long head of the biceps; then I disengage the head of the humerus, and remove it through the wound in the deltoid by means of my fingers, or of an elevator. I bring the humerus up to the shoulder,

and fix it in a proper position by means of a sling and a bandage. Such is the operation which I performed on ten patients, in extirpating the head of the humerus; one of these died of the hospital fever, two of the scurvy, at Alexandria, and the fourth, after he was cured, died of the plague on our return to Syria. The rest returned to France in good health. The arm became anchylosed to the shoulder in some, and an artificial joint allowing of motion was formed in others."

AMPUTATION OF THE HEADS OF BONES.

In a letter, dated 1782, and addressed to Mr. Pott, Mr. Park, surgeon of the Liverpool Hospital, made the proposal of totally extirpating many diseased joints, by which the limbs might be preserved, with such a share of the motions which nature originally allotted, as to be considerably more useful than any invention which art has hitherto been able to substitute.

Mr. Park's scheme, in short, was to entirely remove the extremities of all the bones, which form the joints, with the whole, or as much as possible, of the capsular ligament; and to obtain a cure by means of callus, or by uniting the femur and tibia, when the operation was done on the knee; and the humerus, radius, and ulna, when done on the elbow; so as to have no moveable articulation in those situations.

To determine whether the popliteal vessels could be avoided without much difficulty in the excision of the knee, Mr. Park made an experiment on the dead subject. An incision was made, beginning about two inches above the upper end of the patella, and extending about as far below its lower part. Another one was made across this at right angles, immediately above the patella down to the bone, and nearly half round the limb, the leg being in an extended state. The lower angles formed by these incisions were raised, so as to lay bare the capsular ligament; the patella was then taken out; the upper angles were raised, so as fairly to denude the head of the femur, and to allow a small catling to be passed across the posterior flat part of the bone, immediately above the condyles, care being taken to keep one of the flat sides of the point of the instrument quite close to the bone, all the way. The catling being withdrawn, an elastic spatula was introduced in its place, to guard the soft parts, while the femur was sawn. The head of the bone thus separated, was carefully dissected out; the head of the tibia was then with ease turned out, and sawn off, and as much as possible of the capsular ligament dissected away, leaving only the posterior part covering the vessel, which on examination had been in very little danger of being wounded.

The next attempt was on the elbow, a simple longitudinal incision was made from about two inches above, to the same distance below, the point of the olecranon. The integuments having been raised, an attempt was made to divide the lateral ligaments, and dislocate the joint; but this being found difficult, the olecranon was sawn off, after which the joint could be easily dislocated, without any transverse incision, the lower extremity of the os humeri sawn off, and afterwards the heads of the radius and ulna. This appeared an easy work; but, Mr. Park conceives the case will be difficult in a diseased state of the parts, and that a crucial incision would be requisite, as well as dividing the humerus, above the condyles, in the way done with respect to the thigh bone.

Mr. Park first operated, July 2, 1781, on a strong, robust, sailor, aged 33, who had a diseased knee, of ten years standing. The man's sufferings were daily increasing, and his health declining. Mr. Park, in the operation, wished to avoid making the transverse incision, thinking that after removing the patella, he could effect his object by the longitudinal one; but, it was found that the difference between a healthy and diseased state of parts, deceived him in this expectation. Hence the idea was relinquished, and the transverse incision made. The operation was finished exactly as the one on the dead subject related above. The quantity of bone removed was very little more than two inches of the femur, and rather more than one inch of the tibia. The only artery divided was one on the front of the knee, and it ceased to bleed before the operation was concluded, but the ends of the bones bled very freely. To keep the redundant integuments from falling inwards, and to keep the edges of the wounds in tolerable contact, a few sutures were used. The dressings were light and superficial, and the limb was put in a tin case, sufficiently long to receive the whole of it, from the ankle to the insertion of the gluteus muscle.

We shall not follow Mr. Park throughout the whole treatment. Suffice it to remark, that the case gave him a great deal of trouble, and that it was attended with many embarrassing circumstances, arising chiefly from the difficulty of keeping the limb in a fixed position, the great depth of the wound, and the abscesses and sinuses, which formed in the part. On the other hand, however, the first symptoms were not at all dangerous. But,

the patient was obliged to keep his bed nine or ten weeks, and it was many months more before the cure was complete. The man afterwards went to sea, and did his duty very well, so useful was his limb to him.

Since the publication of the letter addressed to Mr. Pott, another excision of the knee has been done by Mr. Park. This operation was performed on the 22d of June, but the event was unsuccessful, as the patient lingered till the 13th of October, and then died.

About the same time that Mr. Park made his proposal, P. F. Moreau, a French surgeon, wrote in favour of a similar method. It only seems necessary to notice here the difference in Moreau's plan of operating from that adopted by our countryman. Moreau, the son, who has published the account, observes that the multiplicity of flaps is unnecessary, as two answer every purpose; and he deems Mr. Park's direction to remove the olecranon, if this be free from caries, at least useless. Moreau, junior, operated on the elbow as follows: he plunged a dissecting scalpel in upon the sharp edge, or spine of the inner condyle of the os humeri, about two inches above its tuberosity; and, directed by the spine, he carried the incision down to the joint. He did the same on the other side, and then laid the two wounds into one, by a transverse incision, which divided the skin and the tendon of the triceps, immediately above the olecranon. The flap was dissected from the bone, and held up out of the way, by an assistant.

The flesh which adhered to the front of the bone, above the condyles, was now separated, care being taken to guide the point of the instrument with the fore-finger of the left hand, and, when the handle of the scalpel could be passed through between the flesh and the bone, M. Moreau allowed it to remain there, and sawed the bone through upon it. The removal of the piece of bone was next finished, by detaching it from all its adhesions. The removal of the heads of the radius and ulna, remaining to be done, was more difficult, and the first flap being insufficient, it became necessary to make another. The lateral incision, at the outer side of the arm, was extended downwards, along the external border of the upper part of the radius. The head of the radius was separated from the surrounding parts; its connexion with the ulna destroyed, and a strap of linen was introduced between the bones, to keep the flesh out of the way of the saw. The radius was sawn through, near the insertion of the biceps, which was fortunately preserved. Some remaining medullary cells, filled with pus, were removed with a gouge. The ulna was not exposed, by extending the lateral incision on the inner side of the arm. Thus another flap was made, and detached from the back part of the fore-arm, and that part of the bone which it was wished to remove. The bone, separated from every thing that adhered to it, and a strap of linen being put round it to protect the flesh, about an inch and a half of it was sawn off, measuring from the tip of the olecranon, downwards. A few diseased medullary cells were taken away with the gouge. Two or three vessels were tied, and the flaps were brought together with sutures. In a fortnight this man became so well, that he was allowed to go wherever he pleased, with his arm supported in a case. The arm was at first powerless, but it slowly regained its strength, and the man could ultimately thrash corn and hold the plough with it, &c.

Seven months after another operation, performed in the same way as the preceding one, by Moreau the father, the patient was completely cured, and two years after this period, the flexion of the fore-arm on the arm, was very distinct. In another case, only one longitudinal incision, and a transverse one, were made, the flap of course was triangular. The patient got well in six weeks, and in three months more joined his regiment.

In all Moreau's cases, the flexion and extension of the fore-arm were preserved, which circumstance no doubt depended very much on the insertion of the biceps not being destroyed. After the excision of the knee, however, the bones grew together.

Moreau, junior's, method of operating differed from his father's, in having the patient in a recumbent, instead of a sitting, posture, and in sawing the os humeri before it was dislocated.

In a knee case, Moreau the father operated as follows:—He made a longitudinal incision on each side of the thigh, between the vasti and the flexors of the leg, down to the bone. These incisions began about two inches above the condyles of the femur, and were carried down along the sides of the joint, till they reached the tibia. They were united by a tranverse cut, which passed below the patella, down to the bone.

The flap was raised; the patella was attached to it, but being diseased, was dissected out. The limb was then bent to bring the condyles of the femur into view. As it was desired to cut them from the body of the bone, before dislocating them, every thing adhering to them behind, where they joined the body of the bone, was separated, and, at that place the fore-finger of the left hand was passed

through, in order to press back the flesh from the bone, and on that the saw was used. The knee having been bent, Moreau drew the cut piece towards him, and easily detached it from the flesh and ligaments.

The head of the tibia was laid bare by an incision, nearly eighteen lines long, made on the spine of that bone. The first lateral incision on the outer side of the knee, was extended nearly as far down on the head of the fibula. Thus were obtained one flap, which adhered to the flesh filling up the interosseous space, and another triangular flap, formed of the skin, covering the inner surface of the tibia, which bone was of necessity exposed, before the saw could be applied.

Upon raising the outer flap, the head of the fibula came into view, and, after being separated from its attachments, was cut off with a small saw. The inner flap was then raised, and the tibia, having been separated from the muscles behind, its head was sawn off.

It does not appear necessary to insert in this work the account of cutting out the ankle joint; an operation which will never be extensively adopted; nor shall I add any thing more concerning the mode of removing, in a similar way, the shoulder joint. In treating of amputation in this situation, I have already said enough, and whoever wishes for further information, respecting this practice, must refer to Dr. Jeffray's Work, entitled "*Cases of the Excision of Carious Joints.*" This publication contains all that is known on the subject. Dr. Jeffray has recommended a particular, and, indeed, a very ingenious, saw, for facilitating the above operation. The saw alluded to is constructed with joints, like the chain of a watch, so as to allow itself to be drawn through behind a bone, by a crooked needle, like a thread, and to cut the bone from behind forward, without injuring the soft parts. An instrument of this kind was executed in London, by Mr. Richards, who was assisted in making it by his nephew, the present Mr. Richards, of Brick-lane. In placing the saw under a bone, its cutting edge is to be turned away from the flesh. Handles are afterwards hooked on the instrument.

In my treatise on the diseases of the joints, which was honoured with the premium for 1806, by the College of Surgeons in London, I have made the following remarks on the excision of the large joints. "My sentiment has been already stated, with regard to the time, when every hope of curing a diseased joint ought to be abandoned. I have stated, that the approach of dissolution, in other words, the sunk state of the system can be the only solid reason for amputation, and that, as long as the patient's strength is not subdued by the irritation of the local disease, humanity dictates the propriety of persevering in an attempt to save the affected limb, &c. Will a patient, greatly reduced by hectic symptoms, be able to recover from so bold and bloody an operation, as the dissection of the whole of the knee-joint out of the limb? If some few should escape, with life and limb preserved, would the bulk of persons, treated in this manner, have the same good fortune? I cannot admit, that the extirpation of the whole of so large an articulation as the knee, can be compared with the operation of amputation, in point of simplicity and safety. However, it is not on the difficulty of practising the former, that I would found my objections; for, I believe, that any man possessing a tolerable knowledge of the anatomy of the leg, might contrive to achieve the business." "The grounds on which I shall at present withhold my approbation from the attempt to cut out large joints, are the following:—1. The great length of time which the healing of the wound requires. Whoever peruses the case of Hector M'Caghan, will find that the operation was performed on the 2d of July, 1781, and that it was February 28th of the following year, before all the subsequent abscesses and sores were perfectly healed. This space of time is very nearly eight months! Mr. Park describes the patient as a strong, robust sailor, and gives no further particulars concerning the state of his constitution, than that his health was declining. I entertain little doubt, that if the excision of the knee had been performed in that state of the health, in which amputation becomes truly indispensable, this man would not have survived the illness arising from the operation. The only other case, in which Mr. Park extirpated the knee, ended fatally. In the instance related by Moreau, there seemed, indeed, to be considerable debility. This patient escaped the first dangers consequent to so severe an operation; and, *after three months confinement*, the patient was in such a state, that *Moreau expected he would be able to walk upon crutches in another month or six weeks!* The young man in the mean time was attacked by an epidemic dysentery, and died. 2. Even supposing the excision of the knee to be followed with all possible success, is the advantage of having a mutilated, shortened, stiff limb, in lieu of a wooden leg, sufficiently great to induce any man to submit to an operation, beyond a doubt infinitely more dangerous than amputation? I think not." (See *the author's Treatise on the Diseases of the Joints*, p. 138.)

AMPUTATION OF THE FINGERS AND TOES, AND PART OF THE FOOT.

Mr. Samuel Sharp observes, that the amputation of the fingers and toes is better performed in their articulation, than by any of the other methods. For this purpose a straight knife must be used, and the incision of the skin be made not exactly upon the joint, but a little towards the extremity of the finger, that more of it may be preserved for the easier healing afterwards. It will also facilitate the separation in the joint, when you cut the finger from the metacarpal bone, to make two small longitudinal incisions on each side of it first.

It may happen that the bones of the toes, and part only of the metatarsal bones, are carious, in which case the leg need not be cut off, but only so much of the foot as is disordered. A small spring saw is here better than a large one. When this operation is performed, the heel and remainder of the foot, will be of great service, and the wound heal up safely, as Mr. Sharp has once seen. *(Operations of Surgery.)*

In amputating the fingers and toes, the operation is greatly facilitated by cutting into the joint when it is bent. Having made an opening into the back part of the capsule, one of the lateral ligaments may easily be cut, after which nothing keeps the head of the bone from being turned out, and the surgeon has only to cut through the rest of the exposed ligamentous and tendinous parts.

Some recommend making a small semicircular flap of skin to cover the bone; but this is quite unnecessary, if care be taken to draw the skin a little up, and to cut where Mr. Sharp directs.

Mr. Hey describes a new mode of removing the metatarsal bones, which, on repeated trial has fully answered his expectations. Mr. Hey makes a mark across the upper part of the foot, to denote where the metatarsal bones are joined to those of the tarsus. About half an inch from this mark, nearer the toes, he makes a transverse incision, through the integuments and muscles covering the metatarsal bones. From each extremity of this cut, he makes an incision along the inner and outer side of the foot to the toes: he removes all the toes from the metatarsal bones, and then separates the integuments and muscles, forming the sole of the foot, from the inferior part of the metatarsal bones, keeping the edge of the knife as near the bones as possible, in order to expedite the operation, and preserve as much muscular flesh in the flap as can be saved. He then separates the four smaller metatarsal bones, at their junction with the tarsus, and divides, with a saw, the projecting part of the first cuneiform bone, which supports the great toe. The arteries being tied, Mr. Hey applies the flap, which had formed the sole of the foot to the integuments, which remain at the upper part, and keeps them in contact with sutures. The cicatrix being situated at the top of the foot, is in no danger of being hurt, while the place where the toes were situated, is covered with such strong skin, viz. what previously formed the sole of the foot, that it cannot be injured by any moderate violence. (See *Practical Observations in Surgery, p. 535, &c.*)

It is certainly very often quite unnecessary to remove the whole foot, when the metatarsal bones are carious, and every other part of the leg is sound. The remainder of the foot is of immense service in walking, as the use of the ankle is not destroyed. Mr. Hey very judiciously recommends dissecting out the metatarsal bone of the great toe, when diseased, from the cuneiform bone, instead of sawing it. The latter plan cannot be easily accomplished, without removing part of the integuments and muscles, and making a transverse, as well as a longitudinal, incision. These disagreeable things may be avoided by following Mr. Hey's method.

The metatarsal bone of the little toe may be removed in a similar way.

It is very awkward to saw the metatarsal, and metacarpal bones, and, when the middle ones are to be divided, is indeed hardly practicable, without injuring the soft parts. I am, therefore, of opinion with Mr. C. Bell, that, instead of a formal amputation, it is better to extract the diseased bones from the foot, or hand, as, indeed, Mr. Hey is in the habit of doing.

After the perusal of the foregoing account of the subject of amputation, I think a surgeon will derive many useful hints from the valuable observations of M. Louis, although his mode of operating is not now imitated, and several of the things, which he recommends, are not at present attended to, I am of opinion, that the practitioner, who is acquainted with his remarks on this operation, will have a decided superiority over another surgeon that is entirely ignorant of them. Many of the observations are incontrovertible; the principles, inculcated, are generally founded on the most correct anatomical considerations; and, in the present indiscriminate fashion of dissecting up the skin, often very unnecessarily, and always to the severe suffering of the patient, I am convinced, that M. Louis's sentiments may be studied with advantage. It is not to be inferred, however, that I suppose the double incision a bad

mode of operating; but, only that I think it the duty of every surgeon to know where the dissection and preservation of skin are necessary, and where not.

ABSTRACT FROM THE MEMOIRE SUR LA SAILLIE DE L'OS APRES L'AMPUTATION, &c. BY M. LOUIS.

The contraction of the muscles has hitherto appeared the most probable reason of the protrusion of the bones, after the amputation of the thigh. There is no complaint of the bones protruding, after the amputation of the arm or fore-arm; and if we observe things carefully in the amputation of the thigh, we shall constantly see muscles protruding from the level of the other flesh, by a real elongation, whilst there are some muscles that are drawn back, even on dead bodies, where undoubtedly the contractile power of the muscles cannot be supposed to act. The solution of these difficulties will remove all the doubts which may arise on the subject here treated of.

The protrusion of the bones will never take place, so long as they are immediately encompassed with the fleshy substance of the muscles: this proposition is incontestable. The state of the skin, whether longer or shorter, conduces nothing to this protrusion, as we have proved. Thus the precaution of drawing it upwards, and preserving as much of it as possible, will not prevent this inconvenience. We do not find this to be the case, either in the leg or fore-arm, because the greater part of the muscles, which are there cut, adhere to the bones, and are contained by aponeuroses, which fix them in their situation. In the amputation of the arm, there is only the biceps-muscle, which can be drawn back towards the upper part. The extremity of the humerus always remains encompassed with the brachial and extensor muscles, which are retained and fixed by their adhesions to the bone itself. From hence proceeds the facility of curing amputations of the arm, without exfoliation of the bone. But, this is not the case with the thigh. Only the crural muscle is there fixed to the bone in its whole extent; but this muscle is very slender, its fibres short, and converging to its axis, which is parallel to that of the bone. The vastus internus, the vastus externus, and the triceps muscles, have also adhesions to the femur; but they are not attached to it, except by their interior edge. The plane of these muscular substances is disembarrassed and pretty large, and consequently capable of changing their direction, and folding over each other, after their resection. All the other muscles are separated from each other, as well as the preceding, by the cellular texture, and there is none of them which, in its direction, is parallel to the axis of the femur. Every one of them cut it, by more or less acute angles. From thence it happens, that when these muscles are divided, they change their direction; there is nothing to maintain them, in order to form an equal surface at the extremity of the stump. I have examined minutely into these matters, by the inspection of dead bodies, and recollected, on this occasion, the amputations I myself had made of the thigh, and the much greater number which I had seen performed by others. I do not think there can be any manner of doubt with regard to this fact. I am likewise fully persuaded, that there are no means of preventing this change of situation in the muscles of the thigh, after its amputation; but it seems to me, that there is a very simple method of preventing the ill effects of this change, with regard to the protrusion of the bone.

It is laid down as a rule, that, besides the tourniquet, which is fixed to prevent the hemorrhage, during the operation, there should be applied a tight ligature immediately above the part, where the circular incision is to be made. All authors, except Le Dran, recommend the use of this ligature, in order to sustain the flesh in such a manner, that it might be cut with the instrument, smoothly and evenly, and with facility. Guy de Chauliac would even have the incision made between two ligatures: Verduc and several others have given the same advice. The modern practice is, not to remove the ligature that sustains the flesh, till after the bone is sawn; and this even our books of surgery prescribe. But in the amputation of the thigh, in case we would prevent the protrusion of the bone, (which it has been impossible to avoid, notwithstanding all the precautions hitherto indicated) we must take care to remove the ligature that secured the flesh, as soon as the section of the soft parts shall be made. The muscles, being set at liberty, will be drawn back immediately, and change their situation; we shall then be able to raise the flesh with the retractor, to direct the bistoury on the crural muscle, and to cut the point of adhesion of the vasti and the triceps at the posterior spine of the femur. By this method the bone may be very easily sawn, three fingers breadth higher, than it could have been, had it been sawn to the level of the flesh sustained by the ligature.

This remark will appear very simple to many; but this simplicity does not diminish, either the importance or solidity of it. This consideration induces me to refer to another memoir, a series of reflections on the same subject, and to conclude

the present with the same words, which Monro, a celebrated professor of Edinburgh, makes use of, at the beginning of his remarks on amputation of the larger extremities. "There is," says he, "in the operations of surgery, an infinity of minute circumstances, which do not appear, at first sight, very important, and which, notwithstanding, the observation or omission of in practice, has considerable consequences, by rendering the cure more expeditious or more tedious; by bringing on or preventing dangerous symptoms; by preserving the patient from violent pains, or increasing them, and putting his life in danger; circumstances, the good or ill effects of which ought consequently to be examined with attention, and concerning which, those who treat of these matters, with a view to the public utility, ought to give the necessary directions."

FROM THE SECOND MEMOIRE SUR L'AMPUTATION DES GRANDES EXTREMITE'S, BY M. LOUIS.

The frequent opportunities of amputating limbs, and the simplicity of the objects of this operation, one might suppose, ought long ago to have brought it to the highest pitch of perfection; but, says M. Louis, it frequently happens, that the most familiar things are those, to which we pay the least attention. Modern writers regard amputation, as an operation much more embarrassing, than difficult; and it is, perhaps, on account of its object bein: simple, and of the proceedings to be followed in its performance, not requiring great dexterity, that surgeons adhere to methods, to which they have been accustomed, without examining, whether the practice is as perfect as it is capable of being rendered. The force of custom has not imposed on me; I have made my remarks on this operation; and, I hope, that such readers, as will duly and impartially consider them, will find them not destitute of utility. I do not pretend to insinuate, that most of the rules, which have hitherto served as a guidance, are faulty; but, I am of opinion, that the best are too vague, and ought to be made more determinate. However solid they may appear in general, they will be found respectively erroneous when applied to particular cases, and great blunders may therefore be committed in their application. The design of amputation is to separate from the rest of the body, a part, the endeavour to preserve which might cause the patient's death. The ancient professors of surgery appear to have always been more occupied about the end, proposed in the practice of this operation, than solicitous to improve the means, by which its pain and inconveniences might be lessened. The nature of the parts, divided in each kind of amputation; their attachments; the change, which naturally or accidentally, takes place in their disposition after the operation; even the uses, which the parts must serve after the cure; are all considerations, says M. Louis, which appear to me to demand different modes of proceeding, which may be usefully varied according to the diversity of circumstances. In this point of view, I intend to examine the received precepts, relative to the surgery of amputations, and shall offer a series of reflections, which seem to me to be applicable to the operation, in respect to each particular member.

SECTION I.

REMARKS ON THE AMPUTATION OF THE THIGH, BY M. LOUIS.

Of all amputations, that of the thigh is the most liable to inconveniences, arising from the method of operating. I have elsewhere explained the reason of this fact (*Vid. Mém. de l'Acad. de Chir. Tom. 5, p. 273. Edit. in* 12*mo.*), and I have pointed out a very simple mode of avoiding them. So important a subject deserves a more circumstantial detail, which I shall now offer with as much precision as is in my power.

The patient being put into a suitable situation, and the tourniquet applied,* an assistant is to draw the skin up towards the upper part of the thigh, where it is to be kept by means of a roller, which is to be applied, with sufficient tightness, round the limb, a little above the place, where the incision is to be made. This band makes the skin tense, steadies the flesh, and serves as a guide for the operator, in the direction of his instrument.

Guy de Chauliac applied a second ligature, below the place, where the amputation was to be done. Experience proves the usefulness of this plan, and several practioners adopt it, although our modern writers have not thought proper to make any mention of it. The skin and flesh, says M. Louis, cannot be too carefully fixed; for the incision can then be made more easily, and with greater regularity.

There is no occasion to repeat here what I have observed in my first memoir against what is called the double incision. It is for the thigh, that the preliminary division of the skin and fat is the most strongly recommended. Heister says, that

* Among the different authors, who may be consulted on the application of the tourniquet, it is essential not to forget Monro, in Edinb. Essays, vol. 4.

he has often seen the bone project, like a stick, two, or three finger-breadths, beyond the flesh, in consequence of the double incision not having been practised. *Si musculi unâ cum cute unâ eâdemque sectione discindantur, musculi hic dissecti fortissimi tantopé sursum retrahuntur, quemadmodum sæpiùs vidi, ut os femoris post alteram tertiamve deligationem, ad duorum, imò trium, transversorum digitorum longitudinem, super carnem, instar baculi cujusdam eminuerit.* (*Heister*, Instit. Chirurg. de Amput. Femoris.)

Notwithstanding this authority, continues M. Louis, I am bold enough to assert, that on the thigh, this preliminary incision of the skin is the least proper. The usefulness of this plan would consist in saving skin enough to cover the muscles; but, their retraction could not be at all lessened by having a greater length of integuments. The precaution that is taken to pull the skin upward, and keep it so with a band, is the more effectual in amputation of the thigh, inasmuch as the retraction of the muscles is here greater. The inconvenience is, that the end of the bone projects beyond the surface of the wound, unsurrounded by the soft parts, which naturally cover it. Besides M. Louis contends, that the preservation of a larger quantity of skin will not supply the deficiency of muscle, with which it is always desirable to cover the bone. Hence, he maintains, that this first incision, so much extolled, is absolutely useless, and that it unnecessarily lengthens the operation, and increases the suffering of the patient. He lays it down, as a precept, founded on reason and experience, that *we should begin the operation by a deep incision, which is to divide the muscles and skin at the same stroke.* The only thing to be observed, in order to make this first incision as well as possible, is to do the whole of the cut with one turn of the amputating knife; an object, which may be accomplished with ease. The surgeon, placed externally, with one knee on the ground, and his right arm under the thigh, which is about to be amputated, is to take hold of the handle of the knife, which is to be presented to him perpendicularly between the patient's thighs. In this position, the point of the instrument is turned towards the operator's chest. Now, if he raises his right hand considerably, and turns his wrist very prone, he will be able to commence the incision externally, carrying it from above downwards. In this first direction of the instrument, he will cut the muscles, covering the outer part of the thigh-bone. Then, carrying the knife in a contrary direction, from below upwards, and round the anterior part of this bone, he will cut the extensor muscles. The instrument is afterwards to be directed from above downwards, in order to divide the muscles situated on the inside of the thigh; and the surgeon, now rising up, is to complete the circular incision, by cutting the parts on the posterior side of the limb. By following this plan, says M. Louis, the flesh will be uniformly cut by one stroke of the knife; and the operator, not having occasion to reapply the instrument several times, he will run no risk of making an irregular section.

As soon as the incision is made, a largish interspace appears betwixt the divided parts. I have remarked, says M. Louis, that this separation was much more considerable in amputations, where only one ligature was applied round the limb. Hence, the gaping of the wound appears to depend principally upon the retraction of the muscles towards their inferior attachments. The ligature which fixes the skin, and presses the whole circumference of the member, above the incision, is an obstacle to the shortening of the muscles, and it should therefore be removed, as soon as the cut has been made. The utility of this method is obvious. The muscles, whose action will now be no more restrained, (especially if M. Petit's tourniquet be employed), will contract, and change their situation, according to the difference of their direction. A small scalpel may then be used, for dividing the cruralis muscle, which is intimately attached to the femur, and may now be cut even higher than the level of the retracted parts. The other portions of muscles attached to the spine of the os femoris, are next to be divided on the same line, and, lastly, the periosteum.

The slit bandage, named a retractor, will be an easy means of enabling the surgeon to cut such fleshy fibres, as are adherent to the bone. There are some writers, who say, that it may be dispensed with; but, it deserves notice, that they have only proscribed its use, when employed with a view of drawing the soft parts upward, in order to protect them from the action of the teeth of the saw; and, it is true, says M. Louis, that in the received mode of operating, the retractor is not absolutely necessary, because the bone is sawn on a level with the flesh, which is steadied and fixed by the ligature. But, as I expressly recommend such ligature to be removed, in order to divide the periosteum, and to saw the bone, higher than the level of the soft parts, the retractor becomes extremely useful. We shall merely observe, that the ends of this slit bandage ought not to be applied too closely to the bone, since its design is to push upwards the soft parts, which are loose and unfixed, in order to facilitate the division of those fleshy fibres which lie close

to the bone, and are firmly attached to it. I shall say nothing about the sawing of the bone, having nothing particular to urge on this point.

The operation, says M. Louis, practised in the way, which I have just now been describing, will be attended with all the advantages, which have been constantly desired, and for the acquisition of which, methods have been practised, which are less simple, and liable to many inconveniences. I here allude to the amputations with two flaps. It is only necessary to read the description of such operations (*Le Dran, Traité des Opérations*), to be convinced, how much this method of amputating increases the patient's suffering; and the idea, thus collected, would not nearly equal that, which would arise from seeing the method tried on the dead subject. We are directed, first to make a circular incision, three or four finger breadths, lower down, than the place, where we intend to saw the bone. The assistant, who holds the upper part of the limb, is to draw the skin upward, and, on a level with it, the flesh is to be divided down to the bone. The point of the knife is then to be pushed through the thickness of the flesh to the bone, exactly at the place where this is to be sawn; and a longitudinal wound is to be made in the integuments and muscles, which is to terminate at the circular incision. The same is to be done on the opposite side. These two incisions must be so managed, that the large vessels will be situated in the middle of one of the flaps. Both these flaps are to be dissected so as to expose the bone; they are then to be drawn up, and kept in this position by a linen retractor. The operator now has an opportunity of making a circular incision through the fibres attached to the bone, and at the same time through the periosteum, on a level with the base of the flaps. Lastly, the bone is to be divided with a saw, that has a very narrow blade.

This concise account of the manner of executing the flap amputation will enable the reader to judge, how painful such operation must be. Without saying any thing about the first cut through the integuments, which is made without any reasonable motive, and may be dispensed with, it is manifest, that the patient has to suffer, in addition to what he suffers in the other operation, two perpendicular wounds, and the dissection of the two flaps thus produced. There can be no doubt, that the swelling and inflammation of the stump, the pain, fever, and all the consequent symptoms, already so formidable, independently of any other cause, in the operation done in the most simple manner, must be much more considerable, in proportion to the number of parts divided, and the larger surface of the wound. And for what is all this train of symptoms and dangers encountered? The sole object is to prevent the protrusion of the bone, to make the soft parts extend beyond its extremity, and to avoid an exfoliation, the tediousness of which sometimes seriously protracts the cure. This last consideration, says M. Louis, is futile enough, since the prolongation of the treatment from this cause does not put the patient's life in any danger. However it may be, the operation, which I have described, has all these advantages; the end of the bone is covered with flesh, and all the intentions, proposed in the flap amputation, are fulfilled in a manner, that is at once easy, less painful, and as free from inconveniences as possible.

The reasons for preferring the method of amputating the thigh, which I have been explaining, admit of intuitive demonstration. I have performed the operation in the presence of many, who are capable of appreciating its merit. The renewal of this mode of practising amputation will be as advantageous for the afflicted, as honourable to surgery. I say, the renewal; for the plan is very ancient, and the first description, which we have of the manual of amputating limbs, is on the principle, which we have been detailing more fully, in order that it may be better understood. Upon this subject, Celsus has thus expressed himself: *Inter sanam vitiatamque partem incidenda scapello caro usque ad os - - - reducenda ab eo sana caro et circa os subsecanda est, ut eâ quoque parte aliquid ossis nudetur; dein id serrulâ præcidendum est, quam proximè sanæ carni etiam inhærenti - - - - Cutis sub ejusmodi curatione laxa esse debet, ut quam maxime undiquè os contegat.* (Corn. Celsus, lib. 7. cap. ultimo.)

In an historical dissertation on the amputation of limbs, which is inserted in the Mémoires de l'Académie Royale des Sciences, année 1732, the late M. Petit (the physician) has quoted this passage in Celsus, *in which he finds much obscurity.* Operations, apparently the most easy, are attended with delicacies, of which only those can be aware, who are in the habit of seeing and reflecting upon them. A surgeon, accustomed to the performance of amputation, and to the consideration of the inconveniences, to which the operation is liable, must be struck with the flash of light, that issues from the words of Celsus. Mr. S. Sharp, a celebrated surgeon in London, is in this case; but, prepossessed about the practice of the day, he has only perceived in Celsus a glimmer, that has astonished him; he knew its safety; but, he did not pursue it. A judgment may be formed of what I have been remarking, from the passage,

that I am going to cite from Mr. Sharp's work.

" The first inconvenience, which I have mentioned, as a consequence of the ancient method of amputating, was the protrusion of the bone; for, making the incision directly down to the bone at once, the muscles and skin afterwards withdrew, leaving a large portion of it either naked, or so little covered, that it always perished, and made an exfoliation necessary. This exfoliation was often a tedious and painful work, and, frequently, by long preventing the cure, reduced the wound at last to an habitual ulcer. Or, if the wound did heal, the cicatrix proved so large, and the stump so pointed, that it was liable to ulcerate again.

" These mischiefs resulted purely from the want of a lax skin in the neighbourhood of the wound; for, cicatrization is not effected by the mere generation of a new skin; but, chiefly, by the elongation of the fibres of the circumjacent skin towards the centre; and it is only when the skin resists a farther extension, that the cicatrix begins to form; from whence, it must plainly appear, that the more lax the skin is, the more readily will the wound heal, and the smaller will be the cicatrix.

" But, though the old surgeons could not apply this maxim to practice, so usefully as the moderns now do, yet, they made some efforts towards it; for, before they amputated, they drew back the skin with all their force, and, after the limb was taken off, they might bring a larger quantity of it over the extremity of the bone, and obviate, in some degree, the inconveniences I have stated. However, this seems to have been all the contrivance they were provided with to answer so great an end; unless, it may be admitted, that Celsus had a faint idea of the double incision; and, to speak my own mind, I question, whether it can be doubted. In his chapter on the gangrene, he unluckily happens to be more concise, than usual;* but, I think, he expressly says, that, after we have cut down to the bone, we must draw back the muscles, and cut deep round the bone, so that a portion of it may be laid bare; after which, it is to be sawn off, as close as possible to the flesh. He tells us, that, by this method of treatment, the skin will be so lax as almost to cover the bone.

" Perhaps, I may have mistaken Celsus's meaning; if I have not, it has been *a great misfortune to mankind, that so beneficial an instruction should have been either overlooked, or misunderstood.* But, it is certain, no writer has copied him, and the double incision, as now perfected, is the invention of another great man (*Cheselden*), to whom posterity will be always indebted for the many signal services he has done to surgery.

" It must be confessed, however, that, notwithstanding we derive such benefits from the double incision, the contractile disposition of the muscles, and, perhaps, of the skin itself, is so great, that, in spite of any bandage, they will retire from the bone, especially in the thigh, and sometimes render the cure tedious.

" To remove this difficulty, I have lately, on some occasions, made use of the cross-stitch, &c. (*Sharp's Critical Inquiry into the present State of Surgery, p.* 282, 284, *Edit.* 4.) The best way of remedying this inconvenience, says M. Louis, is to follow the method, which Celsus has described. It seems that Mr. Sharp was the more called upon to adopt it, inasmuch as he rightly considered it as *a great misfortune to mankind, that so beneficial an instruction should have been either overlooked, or misunderstood.* Led away, however, by the general prejudice, he commends the pretended advantages of the double incision in saving as much skin as possible; but, he immediately afterwards owns the insufficiency of this method, and concludes with proposing, as a very useful assistance, an ancient practice, that is absolutely useless and hurtful. This is the opinion, which Vanhorne entertained of it,† and, in my first memoir on amputation, I have adduced facts, which confirm the sentiment of this writer. Such persons, as will take the trouble of reading attentively the reasons, which Mr. Sharp urges in support of this method, will see,

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* This criticism, passed by Mr. Sharp on Celsus, M. Louis thinks, might be answered by citing what a great man in his time has said of the great men of antiquity. . . Ils avoient l'esprit élevé, des connoissance variées, approfondies, et des vues générales; et s'il nous paroît au premier coup d'œil qu'il leur manquât un peu d'exactitude dans de certains détails, il est aisé de reconnôitre en les lisant avec réflexion, qu'ils ne pensoient pas que les petites choses méritassent une attention aussi grande, que celle qu'on leur a donnée dans ces derniers tems. (*M. de Buffon, Histoire Naturelle, Premier Discours, Tome* 1.)

† Cum Hildano rejicimus Paræi methodum descriptam cap. 21, cum quatuor locis cutis fimbrias acu et filo traducto, ad se invicem adducit, et denudatum os obtegere satagit, ne ab aëre lædatur. Quorsum enim opus est ægrum non profuturis carnificinis excruciare? (*Microtechne, p.* 485. *See also Hildanus, lib. de Gangrænâ et Sphacelo.*)

that his arguments are by no means strong; and, says M. Louis, there is every reason to hope, that, after he has consulted experience, he will alter his opinion, and be generous enough to condemn it. By such conduct, Mr. Sharp has already gained great honour on points of equal importance. Instances of this kind are never afforded, except by men truly great.

General rules, how solid soever they may be, almost always admit of modifications, according to the diversity of the cases, to which they are to be applied. The flap amputation furnishes us with a proof of this observation. I believe, that I have urged strong reasons against this operation: but, it is not to be inferred, that it should be proscribed in all cases. There are even some instances, in which it appears to me, that it ought to be preferred to the other method. In a comminuted fracture, with laceration of the soft parts, where amputation is indispensable, if the circumstances of the accident are such, that there are fewer parts to be divided, and, consequently, the pain will be less, in forming the flaps, than in amputating higher up, according to the other method; in this case, says M. Louis, all other things being equal, I should not hesitate to perform the flap operation. The cases, in which this mode deserves the preference, cannot be precisely specified. Discernment is necessary to rate the advantages and inconveniences of either method, in respect to particular circumstances, as well as a great deal of sagacity, to be able, with a knowledge of the cause, to select the most proper course in delicate occurrences, where nothing less, than the life of a man, is at stake.

SECTION 2.

REMARKS ON THE AMPUTATION OF THE ARM, BY M. LOUIS.

Authors have made no difference, says M. Louis, between the method of amputating the arm, and that which they have advised for cutting off the thigh. External appearances, indeed, would lead to a supposition, that these members are only dissimilar in shape; and that such difference necessarily requires none in the mode of operating. But, when these limbs are viewed less superficially, and the relative disposition, and action of the component parts of the arm are seriously studied, a source of useful reflections will be discovered, with respect to the conduct, which ought to be pursued, in order to perform the amputation of this member with success.

The humerus, from its middle to its lower part, is covered by muscles, which are adherent to it, and whose action is direct, and parallel to the axis of the bone. This is not the case with the thigh: most of the muscles, which form its bulk, are either not at all adherent to the bone, or are only attached to it by surfaces of small extent. Besides, their direction is not parallel to the axis of the femur. Hence, as soon as they are divided, they draw themselves a great way from it, less on account of their retraction, than their change of situation in regard to the bone; for, in becoming merely retracted, they retain their parallelism. In the arm, there is only the biceps muscle, along the front of the limb, which retracts itself under the skin, and how badly soever amputation may be performed, no apprehensions are ever entertained of the denudation of the bone.* The stump is only liable to be pointed, which renders the cure more tedious, than it ought to be. I have several times observed the cause of this inconvenience in the amputation of the arm, and I have noticed it even in operations done by men, who had the reputation of operating well; that is to say, of operating quickly, and with all possible dexterity. The soft parts were properly supported with two ligatures, between which, an incision was made down to the bone. The periosteum having been cut, and scraped downwards, the humerus was sawn precisely on a level with the muscles, according to the received maxim, that we should endeavour to make the section of the bone, and that of the flesh uniform, so that they may appear like a smooth cut, made at one stroke. What I have always seen happen in such a case, then took place: as soon as the circular ligature was taken away, the biceps retracts itself; but, the brachialis internus, the long and short heads of the triceps, and the coracobrachialis, cannot abandon the bone, because they are adherent to it by one of their surfaces. The rest of the fibres, forming the substance of these muscles, and which are not attached to the bone, however, are retracted, and render the stump conical. The operator, engaged in stopping the hemorrhage, and applying the dressings, does not take notice of this retraction; he is entirely taken up with applying the first dressings; and he thinks, that the projection of the bone is caused by the subsequent retrac-

* The denudation of the bone is uncommon even in the thigh, says M. Louis, unless abscesses have promoted the occurrence. The change in the situation of the muscles causes the femur to form a considerable prominence; but, still this bone usually remains covered by the cruralis muscle, and some fibres of other muscles attached to its posterior crista.

tion of the parts, whereas the retraction happens before his face, and is the immediate effect of the method of operating.

I have not perceived the reason of this effect, in the cases, in which I have operated myself, because I carefully followed the precepts given on this subject; and my endeavours to be exact blinded me. I only became conscious of it, as a spectator, when I was sufficiently well informed to reap instruction from the errors of my masters. The pointed form of the stump, after the amputation of the arm, may easily be prevented. If, after the first incision, made deeply down to the bone, the ligature, which supports the soft parts, is removed, they retract. The muscular fibres, adherent to the bone, and the periosteum, may then be divided, on a level with those fibres, which the retraction has brought nearer to their superior attachment. Attention to these circumstances, simple as it may seem, will enable the surgeon to saw the bone an inch higher, than he would be able to do, without such precaution. In this way, says M. Louis, I have accomplished speedy cures, and never had any exfoliations.

The observations, which have just been offered, are only applicable to the amputation of that portion of the arm, where the fibres of the muscles are parallel to the axis of the bone. Another mode of proceeding must be followed in operating at the upper part of the member; for, the case is here altogether different. This is an important consideration, which has not hitherto been adverted to. The attachments and the direction of the different muscles, to be cut, and the alteration unavoidably made in their disposition, according to the attitude, in which the limb is placed, merit particular attention. The deltoid muscle, as is well known, covers the shoulder joint, and reaches externally nearly as far as the middle of the humerus. Its fibres are convergent to the axis of this bone, and its action is direct. In order to amputate the arm towards its upper part, the limb should form a right angle with the body. In this position, the deltoid is shortened by a strong contraction. This shortening, which precedes the division, incapacitates the fibres of this muscle from becoming any further retracted, when they are cut. The deltoid, also, not being adherent to the bone, may be pushed upward with the retractor, so that the bone may be sawn above the level of the extremity of the divided fibres. Therefore, inasmuch as this muscle is concerned, no inconveniences will arise. They are to be ascribed to the ill-made section of the tendons of the pectoralis major and latissimus dorsi. The action of these is likewise oblique, in regard to the axis of the humerus; their fibres form an angle with this bone; and, it follows from this observation, on the structure and action of the parts, that, after the circular incision, the fibres of these muscles will retract, and a gaping wound will be produced, because the shortening of the fibres will happen obliquely, on each side, in a contrary direction. The absorption of the fat, and the shrinking of the soft parts, which, in other amputations, cause the approximation of the skin towards the centre of the division, and are the chief means, by which nature accomplishes the re-union of wounds with loss of substance, cannot have this salutary effect in the wound, that we are considering. It is liable to degenerate into an habitual ulcer. Such instances I have seen, and the reason of them is manifest. The cicatrix never begins to form, till the skin can be extended no further. This is a reflection made by Mr. Sharp. The nearer we approach the upper part of the arm, the more we perceive the cause of this inconvenience, that is to say, of the difficulty, with which the skin extends towards the centre of the wound. The long head of the triceps, and the coracobrachialis, both run obliquely; the last from the coracoid process; the first, from the inferior part of the neck of the scapula; to be inserted into the humerus, one anteriorly, the other posteriorly. When they are cut above their attachments to this bone, there is nothing to hinder their retraction, which will take place obliquely, in contrary directions. Such disposition must obviously be unfavourable to the approximation of the skin to the middle of the wound.

The knowledge of the causes of this inconvenience ought to teach us how to prevent it; and, I believe, the object is not difficult. A preference should here be given to the flap amputation, as would be practised, were it the intention of the surgeon to perform the operation at the shoulder joint. I reserve, for another memoir, some observations on the manner of executing this amputation. Suffice it to mention the advantage of making a flap, when we have to amputate the arm high up near the shoulder. The least reflection on what has been stated, concerning the direction and action of the muscles, will shew, that they could be retained, so as to facilitate the cure, only by preserving them, with the skin, beyond the level of the bone. The making of a flap will even prevent the symptoms, which are liable to be caused by the imperfect division of the tendons of the latissimus dorsi and pectoralis major. Every thing concurs in favour of the adoption of this method. Experience proves the inconveniences of the ordinary operation, as applied to the upper part of the arm. Reason demon-

strates the utility of the practice proposed, and its success has been proved by several cases. M. Trecour, surgeon-major of the regiment of Piedmont infantry, and correspondent of the Academy, has communicated to us an interesting fact on this point.

During the siege of Maestrich, three days before the suspension of arms, M. de Moyon, a lieutenant in the Piedmont regiment, was struck by a cannon ball on the left arm. The humerus was smashed from the elbow to its upper middle portion, as high as within a finger-breadth of its neck. A piece of the posterior part of the bone was left, an inch long, and shaped like the mouth of a clarionet. M. Trecour, on being sent for, went to the hospital of the trenches, and begged such of his colleagues, as he found there, to assist him with their advice. On viewing the considerable splintering, with which the wound was attended, they were of opinion, that the arm should be taken off at the shoulder joint. There were, indeed, motives in justification of their advice. When we are obliged to amputate a limb, that is broken to pieces by any kind of external violence, it is a rule to perform the operation higher up than the wound. But, if the contusing body has been propelled by the force of gunpowder, more extent is given to this precept. We are then directed to amputate above the nearest joint. The reasons, assigned for this doctrine, are principally founded on the inequalities of the bone, which is never smoothly broken, and the splinters of which are apt to extend far above the place, where the violence has operated. Even, when the bone is neither splintered, nor smashed, as far up as the joint above the injury, it is customary to perform amputation above such articulation, if the wound should be near it, under the apprehension, that the shock, which the member has received, may have injured, contused, or even lacerated the capsular ligament. This would give rise to swelling, inflammation, and abscesses of the joint; consequences, of which the patients ordinarily perish.

M. Trecour felt all the validity of these reasons: the natural inference was, that the wound, being situated near the superior articulation of the limb, the amputation must be done in that joint. This case, however, gave rise to some doubts. The patient, aged eighteen years, was of the most delicate constitution imaginable; and he seemed little able to bear so tedious an operation, the consequences of which are sometimes grievous. Such are the sinuses, which are formed along the tendons, and reach even into the substance of the muscles. The advice of M. Trecour, was, therefore, followed, which was to make two lateral incisions, to turn up the flap of the deltoid, and, if the head and neck of the humerus should be found to be unbroken, not to amputate at the joint. Things proved to be so, and the bone was sawn through at its cervix, just at the base of the fragment shaped like the mouth of a clarionet. The flaps, which were saved, extended more than two finger-breadths beyond the end of the bone.

Although the operation took up little time, the patient fell into a debilitated state, so that his life appeared to be in danger. It was necessary to support him with cordials for two days; the plan succeeded; no future bad symptom occurred; and the patient got perfectly well.

M. Trecour assures us, that, the same day, on which this operation was performed, his colleagues had occasion to do two amputations in a similar way, for nearly the same sort of injuries, and that the cases did exceedingly well. From these facts, he makes the following inference: "Among the motives, assigned for the practice of amputating limbs higher than the articulations, above the wound, we should not so generally adopt that, which is deduced from the commotion of the ligaments, holding the heads of the bones in their cavities. It even appears, that the more the bone is broken, the less the shock and concussion must be; as may be observed in injuries of the head, where the commotion is greater, or less, on account of the resistance made by the bones of the cranium."

There are few cases, which do not offer some circumstance or another, that has not been the object of particular consideration, and that would constantly escape our notice, were we not engaged in elucidating some particular doctrine, with which it is connected. M. Trecour mentions, that he sawed the bone at the base of the end of the fracture. A cursory perusal of this circumstance does not appear to present any prospect of material improvement in practice; yet, says M. Louis, it has been of use, inasmuch as it has led us to investigate the difficulties, which occur in this operation. There is no surgeon, at all versed in practice, that has not experienced the trouble there is in fixing the part during the action of the saw, even in operations, where the limb is entire, and, consequently, where there is the best opportunity of holding it with firmness. The reason of this is self-evident. The assistants only afford moveable points of support; and whatever pains they may take to fix the extremity operated upon, they cannot prevent the motion, which takes place involuntarily in the articulation of the limb with the

trunk. But, when we have to saw the end of a bone, which can hardly be laid hold of, the difficulty in fixing it must be far greater. M. Bertrandi informed me, that he has been a witness of this inconvenience. A Piedmontese officer did not get well after amputation of his thigh, because the bone protruded. It was therefore determined to saw the projecting part off. Endeavours were made in vain to effect this operation; the limb could not be kept steady enough. M. Bertrandi then proposed a very simple means, which answered the purpose, and which he has since employed with success. It is a machine, composed of a perpendicular piece of wood, firmly fixed on a foot and notched at its upper part, so as to form a kind of fork. This notch affords the end of the bone an invariable fixed point, which renders an assistant unnecessary for this object, who may now be employed in pressing upon the limb, till the bone is half sawn through. The part must afterwards only be held laterally. With this machine, the bone cannot slip about, and it may be sawn, with as much ease, as a stick on a trestle. This means appears to me commendable on account of its simplicity, and, I believe, there are numerous occasions, on which it may be employed with advantage. In common amputations, a machine, constructed on the principle of the Ambi of Hippocrates, in order to support the limb, together with a contrivance, that would answer the views of Bertrandi, might be used, in cases, where assistants are not at hand, or instead of careless stupid assistants, by whom the bone is frequently splintered.

SECTION 3.

REMARKS ON THE AMPUTATION OF THE LEG, BY M. LOUIS.

Such authors, as have treated the most correctly of the amputation of the leg, have paid some attention to the particular disposition of the parts, which compose the limb. They have recommended the operation to be done below the tuberosity of the tibia, in order to avoid cutting the tendons of the muscles. They have determined, that the operator should place himself between the patient's legs, for the sake of sawing the bone with most ease; and they have given directions, how to employ the saw most advantageously. Such are nearly the particular objects, on which they have dwelt. A considerate reflection on the relative disposition of the parts, which enter into the formation of the leg, cannot fail to furnish room for more extensive remarks on this operation.

The absorption of the fat, the subsidence of the soft parts, and the diminution of the cellular substance, cause the skin to advance considerably over the stump in amputations of the arm and thigh; and we have shewn, says M. Louis, that the integuments can never contribute to the inconveniences following those operations. But, this is not the case, with regard to the leg; here the skin is the immediate covering of a large surface of the principal bone. There are no soft parts interposed, the primitive retraction and subsidence of which can occasion the skin to project on the stump. The precept, therefore, to preserve as much of the integuments as possible essentially claims the surgeon's case in the amputation of this part. The precautions directed, on this account, consist in pulling the skin firmly towards the knee, and in adopting the double incision. The ancients observed the first of these rules; they were ignorant of the second; but, they obtained all its advantages by the position of the patient, and the attitude, in which the limb was put during the operation. We are in the habit of having the thigh and leg held horizontally. This posture is attended with obvious objections; for, after the operation, the thigh and stump are placed in a state of flexion, by which means, the skin is drawn up, and the end of the tibia is necessarily denuded.

Ambroise Paré wished, that "*la jambe fut un peu ployée pendant l'opération, et qu'on l'étendit ensuite, afin que les vaisseaux fussent plus saillans.*" This precaution appeared to him necessary, because he used to take up the vessels with forceps in order that they might be tied. Guillemeau carried his views further; he knew the advantage of bending the leg, during amputation, in promoting the extension of the skin over the end of the bone after the operation. He directs, that the surgeon "*se mettra entre les jambes du malade, et commandera à un serviteur de rehausser contremont le plus qu'il pourra le cuir et les muscles situés en la partie qu'il conviendra extirper, ayant auparavant fait* plier et flechir *ledit membre, tant* afin de faire prolonger la peau, *que les veines et les arteres.*"

The reasons, why this useful position has been abandoned, are naturally obvious. The limb in amputating must be firmly held; and, when the thigh and leg are bent, it is extremely difficult for the assistants to fix the lower extremity. M. Louis says, it is surprising, that, among the successors of Paré and Guillemeau, not one should have paid attention to the advantages of the posture, which these celebrated men recommended, with a view of obviating inconveniences, which they had experienced.

M. Louis next speaks of an apparatus, by which the leg might be rendered suffi-

ciently steady in the bent position to admit of the saw being used; but, the observations on this subject I have omitted. M. Louis, indeed, acknowledges, his conclusion, that the horizontal position will be always continued by practitioners. In this circumstance, says he, the precaution of drawing the skin up towards the knee will not suffice for the preservation of an adequate quantity. Hence, the double incision has been resorted to; i. e. the skin is first divided by a circular incision, an inch below the place, where it is intended to saw the bone, in order to be able to draw the integuments upward, and keep them there with a band, while the muscles are cut on a level with them. I have examined this mode of proceeding attentively, and, I am of opinion, that it admits of being shortened, so as to lessen the pain of the operation. The gastrocnemius and solæus muscles, which form the major part of the bulk of the leg, and are the only ones not adherent to the bone, retract as soon as divided. The skin, which is insusceptible of such retraction and is more extensible, will always project more than those muscles, even were the latter cut on the same line with the wound of the integuments. It follows from this consideration, that the operation by the double incision can only be commendable, on the ground of having a sufficient quantity of skin to cover that portion of the tibia, which is directly under the integuments; and thus, says M. Louis, the benefit, expected from the double incision, is limited to a part of the circumference of the member. But, this advantage may be obtained, by merely making, through the skin of the anterior part of the leg, a semicircular incision, reaching from the internal edge of the tibia to the outside of the fibula. In this method, the patient will be saved from the pain, that would arise from dividing the skin, so as to make the cut completely circular. This first cut may be made more or less advantageously. It has appeared to me, observes M. Louis, that the most proper plan is to draw the skin up, from a point sufficiently low down, and to fix it with a band, in such a way, that the incision, which is to be made above this band, will be an inch lower, than the place where the bone is to be sawn. The band, when applied with due tightness, will keep the skin from descending, and will aid in fixing the soft parts, above the part, where they are to be divided. The semicircular incision of the integuments having been made with a common scalpel, the skin must be drawn upward; there it is to be kept by means of another band; and then the section of the soft parts is to be completed, on a level with the skin, thus raised on the front of the limb.

In performing this second incision, it will be very useful to incline the edge of the knife obliquely upwards. By this means, the skin will be longer, than the muscles, and the cure will be considerably accelerated, &c. After this incision, the flesh, betwixt the two bones, is to be divided, and, then, the periosteum, as usual.

It remains to saw the bones. Authors have given different advice on this subject. Some say, we should begin with the fibula, and end with the tibia; because, if we were to saw through the tibia first, the fibula, remaining alone, would hardly be able to bear the action of the saw, without great disturbance of the soft parts. Others, whose counsel is most listened to, recommend us to apply the saw to both bones, in such a manner, however, that we are to begin with dividing a part of the tibia, until the instrument has reached the fibula, when the two bones are to be sawn together. Thus, the tibia serves, as a support, while the fibula is divided, and the sawing ends with completing the section of the tibia. This practice seems very rational; but, it does not entirely prevent the moveableness of the fibula, which, unless care be taken, will move about under the saw, and even cause laceration of the muscles. In order to avoid this inconvenience, says M. Louis, I have always taken care to direct the assistants, who hold the limb, to press the fibula strongly against the tibia. This precaution, however, cannot be followed, when the bones are much broken, nor in cases of worm-eaten caries, and it is always less safe and commodious, than a plan, which, in these cases, is adopted by Bertrandi. As soon as this surgeon has divided the flesh, which is between the bones, before sawing them, he applies round them a strong narrow ligature. This cord brings the fibula nearer the tibia, and fixes it in a way, that materially facilitates the action of the saw. It is only by combining several little practices of decided utility, that we can expect to bring the operative part of surgery to perfection.

On the subject of Verduin's mode of amputating the leg so as to form a flap, M. Louis observes, that the operation is far more painful, than that which is ordinarily performed, and Verduin is candid enough to believe this, rather than the modern panegyrists of his method. Verduin states positively, that it is cruel and embarrassing; but, carried away, as he was, with the ambition of being praised, as the inventor of a new practice (of which, by the by, not he, but Loudham was), his seduced imagination made him see unreal advantages in this method, and blinded him, in respect to its defects. In speaking

of a young man, on whom this operation was successfully performed, Verduin states, that he walks and bends his knee so freely, that it is hard to say, which leg is of the most use to him. Such an exaggeration, observes M. Louis, is not unusual with an author, whose foible is to insist on the merit of his own invention. But, it is very singular, that a modern writer, the only one, who has bestowed unqualified praise on this method, should have alleged, in the most extravagant strain of prejudice, that officers, on whom this operation have been done, have been seen dancing and jumping, just as if they had real legs. Such gratuitous assertions, says M. Louis, are not to be believed; they are the effect of immoderate admiration, and can deceive nobody.

I shall pass over what M. Louis urges against Verduin's pretension to effect a cure by apposition of the parts, without suppuration.

It was alleged, that they, on whom the flap amputation of the leg had been performed, suffered no sympathetic pain in the limb. Verduin thought, that this was proved by an example, in which a man had had his leg cut off at sea. He felt severe and grievous pains, seeming as if they were in the amputated foot. As the stump was too long, part was amputated by the new method, and the shootings and pains, formerly experienced, were no longer felt. Celsus, observes M. Louis, would not have approved this second operation; but, would have considered it as superfluous: *Stultum est decoris causâ rursùm et dolorem et medicinam sustinere, lib. 5. cap. 26.* Had Verduin been offering his opinion on the invention of another, he would have perceived reasons in explanation of the pains being relieved; and, no doubt, he would not, for want of such reasons, have argued, that a solitary fact was sufficient to establish a general consequence. Indeed, about five years after Verduin's dissertation was published, the famous Ruysch assisted at an operation, performed according to this new method; it succeeded; but, the patient was not exempt from the sympathetic pains. Besides, there is no reason authorising the supposition, that such an advantage would result from this manner of operating.

Another point, adverted to by M. Louis, is the moveableness of the stump. The panegyrists of this method have regarded the preservation of the motion of the knee, as an advantage exclusively belonging to this operation. But, Verduin positively states, that the motion of the knee continues free, if care be taken to move it, from time to time, during the treatment. Would not the same thing happen, after the common operation, with the same precaution? The saving of a flap cannot at all promote the motion of the stump, since the use of the muscles, which compose such flap, is to move the foot. The motion of the stump depends upon the action of muscles, which are situated in the thigh, and which are inserted into the leg, above the place, where the amputation is performed. The motion of the knee may, therefore, be preserved after the ordinary operation; and it is not an advantage particularly arising from the flap amputation, as has been asserted, through inattention to the mechanical arrangement, and the use of the parts.

With regard to the utility, alleged to proceed from the flap serving as a cushion to the bone, so that the patient bear on the end of the stump, without any inconvenience, or pain, M. Louis remarks, that he knows not, whether the portion of flesh, that grows in its new situation, is of a nature to sustain, without any ill effects, the weight of the body, under narrow surfaces, and a substance, as hard as the ends of the bones; but, that, to facilitate progression with an artificial leg, which imitates the natural one, there is no occasion for the weight of the body to bear on the end of the stump. The size of the upper part of the tibia allows a machine to be adapted, that will afford, under the head of this bone, a circular point of support, on which the weight of the body may be sustained.

M. Louis argues, that nearly all the partisans of the flap operation, before the time, when he wrote, had only extolled it speculatively. Garengeot was the only one that had practised it. It is a reflection against the real superiority of this method, that it has been relinquished in the very country, where it was first received as an important discovery, and where it had been originally practised with success, by surgeons of skill and reputation. Good things, adopted by several persons at once, in different parts, do not usually fall into disrepute, especially, if pains be taken to cultivate the art, and keep it from declining. Had the flap amputation possessed all the advantages, that were ascribed to it, it would not so soon have been abandoned. Objections to the plan must also have conduced to its declension. M. Louis then adverts to the probability, that abscesses frequently formed in the stump, when any part of the flap did not unite; and he concludes with observing, that if the retraction of the muscles, composing the flap, prevented the bone being covered, all the alleged benefit of the plan was lost. This might the more easily happen in the leg, inasmuch as the bones were at the circumference of the wound, and the largest surface, which they presented, was exactly at that point of the circumference, which

was opposite the base of the flap, towards which the retraction must have taken place. In relating the inconveniences and objections, which present themselves to me (says M. Louis), I do not mean to deny the facts in testimony of the success of the operation; the object of the discussion is to ascertain, if this plan is preferable to the other.

SECTION 4.

REMARKS ON THE AMPUTATION OF THE FOREARM, BY M. LOUIS.

Of all the amputations, which I have seen, that of the forearm most frequently proves unsuccessful. From the middle to the lower end of this part of the limb, the member is composed of numerous tendons; and amputation, done at any point of this extent, leaves the bone denuded, and the cure is tedious and painful.

Towards the upper part of the forearm, the radius and ulna are sufficiently covered with muscles, which never leave the bone denuded, because they are adherent to it, and are bound down by strong aponeuroses. These tendinous expansions even pass into the interstices of the muscles, and furnish these organs with particular sheaths, serving to confine them in their proper direction. The knowledge of this structure of the parts will indicate to us certain rules of conduct, which will contribute to the perfection and success of our operations.

The preliminary division of the skin, which we have rejected as useless in some cases of amputation, is essentially proper in that of the forearm. The adhesion of the muscles, and the way, in which they are fixed in their direction, make it necessary to save as much skin as possible, in order that this may extend to the edge of the divided muscles. In order to make this first cut advantageously, continues M. Louis, the inferior ligature should first be put round the limb, with the precautions, which have been explained in speaking of the amputation of the leg. While an assistant draws the skin upward, as much as possible, in embracing the whole circumference of the limb with both his hands, the operator is to apply the ligature at least an inch lower than the place, where he designs to saw the bones. He is then to make a circular incision, above this ligature, the assistant observing at the same time to pull the skin towards the elbow joint. The upper ligature is next to be applied with a view of fixing the soft parts, and the skin that is drawn up, and the muscles are to be divided on a level with it, in the ordinary way.

For making these incisions, says M. Louis, the curved knife does not appear to me so convenient, as a bistoury with a slightly convex edge; for, the forearm is not round, its figure being that of an oval, flattened on the inside. When the muscles and periosteum have been completely divided, the bones are to be sawn. The limb is usually put in a state of pronation, the surgeon standing on the inner side. The saw is to be applied horizontally, in such a manner, that the bones may be cut at once, beginning, however, with the ulna. The radius, every body knows, is exceedingly moveable, and is much more difficult to fix, than the fibula. M. Louis, therefore, conceived, that it might be an useful precaution, to tie the two bones of the forearm together with a ligature, as Bertrandi used to do, with respect to those of the leg. (See *Mémoires de l'Acad. de Chirurgie, Tom. 5, Edit. in* 12*mo.*)

The following sources of instruction, on the subject of amputation, are particularly entitled to notice: *Celsus de Re Medicâ. Œuvres de Paré, livre* 12, *chap.* 30 *and* 33. *Sharp's Operations of Surgery, chap.* 37. *Sharp's Critical Enquiry into the present State of Surgery, chap.* 8. *Rouzon's Traité des Plaies d'Armes à Feu. Bertrandi's Traité des Opérations de Chirurgie, chap.* 23. *Le Dran's Traité des Opérations de Chirurgie. Heister's Instit. Chirurg. Pars* 2. *Sect.* 1. *Young's Currus Triumphalis e Terebinthinâ, Londini* 1679. *Nouvelle Méthode pour faire l'opération de l'Amputation dans l'Articulation du Bras avec l'Omoplate par M. la Faye. Histoire de l'Amputation, suivant la Methode de Verduin et Sabourin, avec la Description d'un nouvel instrument pour cette Opération, par M. la Faye. Moyens de rendre plus simple et plus sûre l'Amputation à Lambeau, par M. de Garengeot. Observation sur la Resection de l'Os, après l'Amputation de la Caisse, by M. Veyret. Mémoire sur la Saillie de l'Os après l'Amputation des Membres; où l'on examine les causes de cet inconvénient, les moyens d'y remédier, et ceux de la prevenir, par M. Louis. Second Mémoire sur l'Amputation des Grandes Extrémites, par M. Louis. The foregoing Essays are in Mém. de l'Acad. de Chirurgie, Tom. 5. Edit.* 12*mo. Essai sur les Amputations dans les Articles, par M. Brasdor, in Tom.* 15. *of the same work. Bilguer on the Inutility of Amputation. White's Cases in Surgery. Bromfield's Chirurgical Observations and Cases, Vol.* 1. *chap.* 2. *O'Halloran's Treatise on Gangrene, &c. with a new method of Amputation. Alanson's Practical Observations on Amputation. Pott's Remarks on Amputation. Sabatier's Médecine Opératoire, Tom.* 3. *Hey's Practical Observations in Surgery, Edit.* 2. *Remarques et Observations sur l'Amputation des Membres, in Œuvres, Chir. de Desault par Bichat. Tom.* 2. *Encyclopédie Méthodique, Partie Chirurgicale, Tom.* 1. *art. Amputation. Rees's Cyclopædia, art. Amputation. Vermischte Chirurgische Schriften,*

von J. L. Schmucker, Band. 1. *John Bell's Principles of Surgery. Cases of the Excision of carious Joints, by Park and Moreau, published by Dr. Jeffray. Operative Surgery, by C. Bell, Vol.* 1. *Richter's Anfangsgründe der Wundarzneykunst, Band* 7. *Richerand's Nosographie Chirurgicale, Tom.* 4, *Edit.* 2. *B. Bell's Surgery, Vol.* 5. *Mémoire sur l'Amputation des Membres, in Pelletan's Clinique Chirurgicale, Tom.* 3. *Gooch's Chirurgical Works—various parts of the three volumes. Larrey's Relation Chirurgicale de l'Armée d'Orient en Egypte et Syrie. Petit's Traité des Maladies Chirurgicales, &c.*

AMYGDALÆ. The tonsils, so termed from their resemblance to almonds. (See *Tonsils.*)

AMYLUM. Starch. The word is derived from α neg. and μυλη, a mill, because starch was formerly made of corn, without being ground in a mill. Powdered starch is sometimes used as an external application to erysipelas; but, chiefly, in glysters, when the neck of the bladder is affected with spasm. The following is the formula used at St. Bartholomew's Hospital. ℞ Mucilaginis Amyli, Aquæ distillatæ, sing. ℥ij Tinct. Opii guttas quadraginta: Misce.

ANASARCA, (from ανα, through, and σαρξ, flesh.) A dropsical disease, in which an aqueous fluid is extensively diffused in the general cellular texture of the body. When less extensive, the complaint is termed, *œdema*, which then becomes a surgical case, unless entirely dependent on constitutional causes.

ANASTOMOSIS, (from ανα, through, and στομα, a mouth.) *Inosculatio.* Anatomists and surgeons imply, by this term, the communications of the blood vessels with each other, or their running and opening into each other, by which the continuance of a free circulation of the blood is greatly insured. The immense importance of this part of our structure, in all cases in which the main artery, or, vein of a limb, is rendered impervious, is particularly conspicuous in aneurisms. (See *Aneurism.*)

ANATRESIS, (from ανα, and τιτραω, to perforate.) Galen signifies, by this term, the operation of trepanning.

ANCHYLOBLE'PHARON. A concretion of the eyelids; a closure of them.

ANCHYLOGLO'SSUM. An accretion of the tongue to the adjacent parts; also being tongue-tied. (See *Frænum Linguæ.*)

ANCHYLOMERI'SMA. A growing together of the soft parts.

ANCHYLOPS, (from αγχι, near, and ωψ, the eye.) Same as Ægylops.

ANCHYLOSIS, (from αγκυλος, crooked.) This denotes intimate union of two bones, which were naturally connected by a moveable kind of joint. All joints originally designed for motion, may become anchylosed, that is, the heads of the bones, forming them, may become so consolidated together, that no degree of motion whatever can take place. Bernard Conner (*De stupendo ossium coalitu*) describes an instance of a general anchylosis of all the bones of the human body. A still more curious fact is mentioned in the *Hist. of the Acad. of Sciences*, 1716, of a child 23 months old, affected with an universal anchylosis. In the advanced periods of life, anchylosis more readily occurs, than in the earlier parts of it. The author of the article *anchylosis* in the *Encyclopédie Méthodique*, mentions his having preserved a specimen, in which the femur is so anchylosed with the tibia and patella, that both the compact and spongy substance of these bones appears to be common to them all, without the least perceptible line of separation between them. In old subjects, the same kind of union is commonly observable between the vertebræ, and between these and the heads of the ribs.

The greater, or lesser degree of immobility, has caused anchylosis to be distinguished into the *true* and *false*. In the true anchylosis, the bones have grown together so completely, that not the smallest degree of motion can take place, and the case is positively incurable. The position, in which the joint has become thus inalterably anchylosed, makes a material difference in the inconvenience resulting from the occurrence. The false anchylosis is that, in which the bones have not completely grown together, so that their motion is only diminished, not destroyed. The true anchylosis is sometimes termed *complete*; the false, *incomplete.*

In young subjects in particular, anchylosis is seldom an original affection, but generally the consequence of some other disease. It very often occurs after fractures, in the vicinity of joints; after sprains, and dislocations attended with a great deal of contusion; and after white swellings and abscesses in joints. Aneurisms, and swellings and abscesses on the outside of a joint, may also induce anchylosis. In short, every thing which keeps a joint long motionless, may give rise to the affection, which is generally the more complete the longer such causes have operated.

When a bone is fractured near a joint, the limb is kept motionless by the apparatus, during the whole time requisite for uniting the bones. The subsequent inflammation also extends to the articulation, and attacks the ligaments and surrounding parts. Sometimes, these only become more thickened and rigid; on other occasions the inflammation produces a mutual adhesion of the articular surfaces. Hence fractures so situated, are

more serious than when they occur at the middle part of a bone. But, it is to be noticed, that all fractures leave, after their cure, a certain degree of stiffness in the adjacent joints; but, this arises from the inactivity, in which the muscles and articular surfaces have been, and may generally be cured by gradually exercising, and increasing the motion of the limb.

The position of an anchylosed limb is a thing of great importance. When abscesses form near the joints of the fingers, and the tendons mortify, the fingers should be bent, that they may anchylose in that position, which renders the hand much more useful, than if the fingers were permanently extended. The knee, on the contrary, should always be kept as straight as possible, when there is danger of anchylosis. The same plan is to be pursued, when the head of the thigh bone is dislocated in consequence of a diseased hip. When the elbow cannot be prevented from becoming anchylosed, the joint should always be kept bent. No attempt should ever be made to *cure*, though every possible exertion should often be made to *prevent*, a true anchylosis. The attempt to prevent, however, is not always proper, for many diseases of joints may be said to terminate, when anchylosis occurs.

When the false, or incomplete anchylosis is apprehended, measures should be taken to avert it. The limb is to be moved as much as the state of the soft parts will allow. Boyer remarks, that this precaution, is much more necessary in affections of the ginglimoid articulations, than of the orbicular onés, on account of the tendency of the former to become anchylosed, by reason of the great extent of their surfaces, the number of their ligaments, and the naturally limited degree of their motion.

The exercise of the joint promotes the secretion of the synovia, and the grating first perceived in consequence of the deficiency of this fluid, soon ceases. A certain caution is necessary in moving the limb: too violent motion might create pain, swelling, and inflammation, and even caries of the heads of the bones. It is by proportioning it to the state of the limb, and increasing its extent daily, as the soft parts yield and grow supple, that good effects may be derived from it. (See *Boyer Mal. des Os. Tom.* 2.) The use of embrocations, and pumping cold water on the joint, every morning, have great power in removing the stiffness of a limb remaining after the cure of fractures, dislocations, &c.

Unreduced dislocations are not always followed by anchylosis. Nature often forms a new joint, especially in persons of the lower order, who are obliged to move their limbs a great deal, in order to obtain a livelihood. The surrounding cellular substance becomes condensed, so as to form, around the head of the luxated bone, a membrane serving the purpose of a capsular ligament. The muscles, at first impeded in their action, become so habituated to their new state, that they resume their functions. This is particularly the case with bones which move in every direction, and have round heads; but, in ginglimoid joints, the heads of the bones are only imperfectly dislocated, and the motion is greatly restrained by the extent of surface; while some of the numerous ligaments are only sprained, not ruptured. These causes promote the occurrence of anchylosis.

Anchylosis may follow contusions of the joints, and such shocks, as the articular surfaces experience in leaping, or falling on the feet, from great heights. This is more likely to happen, when the inflammatory symptoms, resulting from such violence, have not been properly counteracted by bleeding, and other general remedies. Sprains, which violently twist the joints, very often, on this account, cause an anchylosis, especially, when the inflammation has long hindered such joints from being at all moved.

When diseases of joints end in a complete anchylosis, the occurrence is to be looked upon, as a very favourable one. In fact, it is as much a means of cure, as the formation of callus is for the union of broken bones. The disease of the vertebræ, described by Pott, is cured, as soon as the bones anchylose, nor can the patient be considered well, before this event has taken place. See on this subject *l'Encyclopédie Méthodique, Partie Chirurgicale, Tom.* 1. *art. Anchylose. Boyer sur les Mal. des Os. Tom.* 2. *Richerand's Nosographie Chirurgicale, Tom.* 3, *p.* 238, *edit.* 2.

ANEURISM, or ANEURYSM, (from ἀνευρύνω, to dilate.) The tumours which are formed by a preternatural dilatation of a part of an artery, as well as those swellings, which are occasioned by a collection of arterial blood, effused in the cellular membrane, in consequence of the rupture, or opening of the coats of the artery, receive the name of aneurisms. According to the common opinion, then, aneurisms are of two kinds; the first being termed *true;* the second, *spurious*, or *false*. Some writers admit a third species, which is said to happen, when, in consequence of the external coats of the artery having been divided, the internal tunics are protruded, much in the same manner as the peritoneum is by the intestines, or omentum, in cases of hernia. This imaginary case has been denominated the *mixed* aneurism. *Aneurisma herniam arteriæ sistens.* It was no less celebrated a man, than Dr. William Hunter, who first supposed, that a disease, like the last, might proceed from the outer coats of an

artery being cut, and the inner ones becoming consequently dilated. But, the experiments of Hunter and Home, as I shall have occasion to mention again, fully prove, that an aneurism will not arise from the kind of weakness, which cutting, or even stripping off, the external coat of an artery must produce; and Scarpa, as I shall presently notice, satisfactorily shews, that, in all common aneurisms, the internal coats of the affected artery are invariably ruptured or wounded.

It deserves attention, however, that, by the term *mixed* aneurism, Dr. Alexander Monro implied the state of a true aneurism, when its cyst has burst, and the blood has become diffused in the adjacent cellular substance. This event is certainly a real one; but, Dr. Hunter's case may be deemed altogether suppositious. Besides these common divisions of aneurism, there are two other kinds, one named the *aneurismal varix*, or *venous aneurism*; the other called by Mr. John Bell, the *aneurism from anastomosis*; the particulars of both which cases will be offered in due time.

Before the time of Galen, the diseases, now known by the name of aneurisms, do not appear to have been noticed. It was the doctrine of this physician, that such swellings were produced either by anastomosis, or by rupture, and he has described their symptoms, without informing us, however, of the characters by which each of these cases was distinguishable, one from the other. Paulus Ægineta endeavoured to give a more particular account of the diagnosis, and he has detailed different modes of operating, applicable to the various cases of the disease. The sentiment of these writers was adopted by all their successors down to Fernelius, who declared, that every aneurismal tumour was occasioned by a dilatation of the coats of the arteries. This opinion has been almost universally adopted by the moderns, and, until the late publication of Scarpa, few surgeons entertained a suspicion, that a doctrine, so positively taught in the schools, could possibly be erroneous. Even the learned Sabatier says, there can be no doubt, that many aneurisms depend upon the dilatation of the arterial coats; but, continues he, when this happens, the cases present remarkable differences. Sometimes the three arterial tunics are dilated all together. In other instances, only the two internal coats are affected with dilatation. *While, in far more numerous examples, the internal tunics are ruptured, and it is the cellular coat alone, which separates from them, and enlarges, so as to form the aneurismal sac; de sorte que les artères, qui sont dans ce cas, sont diloriquées, suivant l'expression de Lancisi.*

It is difficult to conceive, observes Sabatier, how all the coats of an artery can dilate and yield sufficiently to form the investment of such immense tumours as some aneurisms are. Indeed, that very tunic, which composes the greater part of the thickness of the vessel, and which is termed the *muscular coat*, is known to consist of fibres, whose texture is firm, and little capable of bearing extension. However, Sabatier states, that there are some observations, which prove, that the muscular tunic may become dilated as well as the others. Haller, in describing a very large aneurism, situated in the aorta near the heart, relates, that the innermost coat of this vessel, was ruptured and torn, the loose jagged edges of the laceration being visible in the aneurismal sac. These were squamous, bony, and of little thickness; while the muscular and cellular coats were quite sound. Donald Monro noticed the same thing in five different aneurisms, which occurred in the course of the femoral and popliteal arteries of a man, who had been confined a long while to his bed, after submitting to the operation for the bubonocele. Monro succeeded in tracing the fibres of the muscular coat over these swellings, so that he had no doubt of this tunic being dilated. Sabatier thinks, that it is not to be inferred, that all such writers, as have related the histories of true aneurisms, proceeding from a dilatation of all the arterial coats, can have been mistaken although they have not minutely described the texture of the sac, in which the blood was contained. Yet, possibly, adds the same judicious writer, most of these aneurisms may have been of a similar kind to those, which result from the rupture of the internal tunics of the arteries, and the dilatation of the cellular coat; for, in such tumours, the fragments of the lacerated coats are often blended with osseous, steatomatous, or purulent matter, and confounded with the cellular coat, that forms the exterior investment. (See *Médecine Opératoire, Tom. 3, p.* 160—162.)

We find then from the foregoing observations, that Sabatier was much disposed to consider the true aneurism, or that supposed to be formed by a dilatation of all the arterial tunics, as, by no means a case, that is of usual occurrence, or that has been satisfactorily demonstrated. This eminent surgeon, I think, is the first modern author, who has shewn a propensity to doubt the notion, so generally entertained at the present day, concerning the actual dilatation of all the coats of the artery in cases of true aneurism; and this remark is the more deserving of notice, in consequence of the opinions lately professed by Scarpa on the point in question. The latter writer, we shall presently see, sides entirely with the ancients on this subject, and, as he is unsurpassed in mi-

nute anatomical investigations, and in accuracy of observation, his sentiment cannot fail to have great weight in the matter. Previously, however, to offering an account of his opinions, concerning the formation of aneurisms, it seems proper to make the reader acquainted with the various species of the disease, their ordinary symptoms, and a few other circumstances, as usually explained by surgical writers.

When any part of an artery has the appearance of being dilated, the swelling is commonly named a *true*, or *genuine aneurism*. In such cases, the artery either seems only enlarged at a small part of its track, and the tumour has a determinate border, or, the vessel seems dilated, for a considerable length, in which circumstance, the swelling is oblong, and loses itself so gradually in the surrounding parts, that its margin cannot be exactly ascertained. The first case, which is the most common, is termed the *circumscribed true aneurism*; the last, the *diffused true aneurism*. When blood escapes from a wound, or rupture, of an artery, into the adjoining cellular substance, the swelling occasioned is denominated the *spurious*, or *false aneurism*. In this instance, the blood either collects in one mass, distends the cellular substance, and condenses it into a cyst, so as to form a distinctly circumscribed tumour; or it is injected into all the cavities of the surrounding cellular substance, and extends along the course of the great vessels, from one end of the limb to the other, thus producing an irregular, oblong swelling. The first case is named, the *circumscribed false aneurism*; the second, the *diffused false aneurism*. (*Richter's Anfangsgr. Band.* I.)

Mixed aneurism was the name given by Dr. W. Hunter to one which he supposed might proceed from the outer coats of an artery being cut, and the inner ones becoming consequently dilated. But, the experiments of Hunter and Home, as we shall have occasion to mention again, fully prove, that an aneurism will not arise from the kind of weakness which cutting, or even stripping off, the external coat of an artery, must produce; and Scarpa, as we shall presently notice, satisfactorily shews that the internal coats are always ruptured. By the *mixed aneurism*, Dr. Monro implied, the state of a true aneurism, when its cyst has burst, and the blood has become diffused in the adjacent cellular substance. This event is certainly a real one, but, Dr. Hunter's case may be deemed altogether supposititious.

The symptoms of the circumscribed true aneurism take place as follows: the first thing the patient perceives is an extraordinary throbbing in some particular situation, and, on paying a little more attention, he discovers there a small pulsating tumour, which entirely disappears, when compressed, but, returns again as soon as the pressure is removed. It is commonly unattended with pain, or change in the colour of the skin. When once the tumour has originated, it continually grows larger, and, at length, attains a very considerable size. In proportion as it becomes larger, its pulsation becomes weaker, and, indeed, it is almost quite lost, when the disease has acquired much magnitude. The diminution of the pulsation has been ascribed to the coats of the artery losing their dilatable and elastic quality, in proportion as they are distended and indurated, and, consequently, the aneurismal sac being no longer capable of an alternate diastole and systole from the action of the heart. The fact is also imputed to the coagulated blood, deposited on the inner surface of the sac, particularly, in large aneurisms, in which some of the blood is always interrupted in its motion. In true aneurisms, however, the blood does not coagulate so soon, nor so often, as in false ones. Immediately, such coagulated blood lodges in the sac, pressure can only produce a partial disappearance of the swelling. In proportion as the aneurismal sac grows larger, the communication of blood into the artery beyond the tumour is lessened. Hence, in this state, the pulse, below the swelling, becomes weak and small, and the limb frequently cold, and œdomatous. On dissection, the lower continuation of the artery is found preternaturally small and contracted. The pressure of the tumour on the adjacent parts also produces a variety of symptoms, ulceration, caries, &c. Sometimes, an accidental contusion, or concussion, may detach a piece of coagulum from the inner surface of the cyst, and the circulation through the sac be obstructed by it. The coagulum may possibly be impelled quite into the artery below, so as to induce important changes. The danger of an aneurism arrives when it is on the point of bursting, by which occurrence the patient usually bleeds to death, and this sometimes in a few seconds. The fatal event may generally be foreseen, as the part about to give way becomes particularly tense, elevated, thin, soft, and of a dark purple colour. (*Richter's Anfangsgr. Band.* I.)

A large axillary aneurism, which burst in St. Bartholomew's Hospital, a few years ago, did not burst by ulceration, but by the detachment of a small slough from a conical, discoloured part of the tumour. Since this case fell under my observation, I have had an opportunity of seeing the process, by which an in-

guinal aneurism burst: at a certain point, the tumour became more conical, thin, and inflamed, and here a slough, about an inch in width was formed. On the dead part becoming loose, a profuse bleeding began. We are then to conclude, that external aneurisms do not burst by ulceration, but, by the formation and detachment of a slough.

The *false aneurism* is always owing to an aperture in the artery, from which the blood gushes into the cellular substance. The case may arise from an artery being lacerated in violent exertions; but, the most common occasional cause is a wound. This is particularly apt to occur at the bend of the arm, where the artery is exposed to be injured in attempting to bleed. (For this case see *Hemorrhage.*) In this circumstance, as soon as the puncture has been made, the blood gushes out with unusual force, and in a bright scarlet, irregular, interrupted current. It flows out, however, in an even, and less rapid stream, when pressure is applied higher up than the wound. These last are the most decisive marks of the artery being opened; for blood often flows from a vein with great rapidity, and in a broken current, when the vessel is very turgid, and situated immediately over the artery, which imparts its motion to it. The surgeon endeavours precipitately to stop the hemorrhage by pressure, and he commonly occasions a *diffused false aneurism.* The external wound in the skin is closed, so that the blood cannot escape from it; but, hence, it insinuates itself into the cellular substance. The swelling, thus produced, is uneven, often knotty, and extends upward and downward along the track of the vessel. The skin is also usually of a dark purple colour. Its size increases, as long as the internal hemorrhage continues, and, if this should proceed above a certain pitch, mortification of the limb ensues.

The *circumscribed false aneurism* arises in the following manner. When proper pressure has been made in the first instance, so as to suppress the hemorrhage; but, the bandage has afterwards been removed too soon, or before the artery has healed, the blood passes through the unclosed wound, or that which it has burst open again, into the cellular substance. As this has now become agglutinated by the preceding pressure, the blood cannot diffuse itself into its cells, and, consequently, a mass of it collects in the vicinity of the aperture of the artery, and distends the cellular substance into a sac. Sometimes, though not often, this circumscribed false aneurism, originates immediately after the opening is made in the artery. This chiefly happens when the aperture in the vessel is exceedingly small, and, consequently, the hemorrhage takes place so slowly, that the blood, which is first effused, coagulates, and prevents the entrance of that which follows into the cavities of the cellular substance, and, of course, its diffusion. A membrane, aponeurosis, &c. may also be just over the orifice, so as to prevent the aneurism from being diffused.

The circumscribed false aneurism consists of a sac, composed of cellular substance, filled with blood, and situated close to the artery, with which it has a communication. At every pulsation, fresh blood gushes from the opening of the artery into the sac, and distends it; but, its elasticity then makes it contract a little, and urge a portion of the blood back into the vessel. Hence, in false aneurisms, a throbbing is always perceptible, and is more manifest, the smaller such tumours are. The larger the sac becomes, the less elastic it is, and the greater is the quantity of coagulated blood in it; so that in very large aneurisms of this kind, the pulsation is sometimes wholly lost.

The tumour is at first small, and on compression entirely disappears; but, returns as soon as this is removed. It also diminishes, when the artery above it is compressed; but, resumes its wonted magnitude, immediately such pressure is discontinued. When there is coagulated blood in the sac, pressure is no longer capable of producing a total disappearance of the tumour, which is now hard. The swelling is not painful, and the integuments are not changed in colour. It continually increases in size, and, at length, attains a prodigious magnitude.

The following are generally enumerated, as the discriminating differences between circumscribed true and false aneurisms: the true aneurism readily yields to pressure, and as readily recurs on its removal; the false one yields very gradually, and returns in the same way, as the blood in the sac can only pass and repass slowly through the aperture in the artery. Frequently, a hissing sound is very audible, when the blood gushes into the sac. The pulsation of the false aneurism is always more feeble, and, as the tumour enlarges, is sooner lost, than that of the true one, which even throbs after it has acquired a very considerable volume. The sac of the true aneurism is the artery itself; that of the false one is cellular substance. (See *Richter's Anfangsgr. Band.* 1.) Besides these common divisions of aneurism, there are two other kinds, one named the *aneurismal varix*, or *venous aneurism*, the other called by Mr. J. Bell, the *aneurism from anastomosis*; the particulars of both of which will be presently explained.

If the doctrines, however, of Professor Scarpa, of Pavia, which were published in 1804, are correct, the grand distinction of aneurism into *true* and *false* must be rejected, as erroneous: "for," says he, "after a very considerable number of investigations, instituted on the bodies of those, who have died of internal, or external aneurisms, I have ascertained, in the most certain and unequivocal manner, that there is only one kind, or form of this disease; viz. that caused by a solution of continuity, or rupture of the proper coats of the artery, with effusion of blood into the surrounding cellular substance; which solution of continuity is occasioned sometimes by a wound, a steatomatous, earthy degeneration, a corroding ulcer, a rupture of the proper coats of the artery, I mean the internal and muscular, without the concurrence of a preternatural dilatation of these coats being essential to the formation of this disease; and, therefore, that every aneurism, whether it be internal, or external, circumscribed, or diffused, is always formed by effusion." *Treatise on Aneurism, by A. Scarpa. Transl. by Wishart. Preface.* If this opinion be true, the difference in the symptoms of aneurisms above related, is to be imputed to the difference in the degree of rupture, diffusion, &c.

Scarpa observes, that it is an error to suppose, that the aneurism at the curvature, or in the trunk, of the aorta, produced by a violent and sudden exertion of the whole body, or of the heart in particular, and preceded by a congenital relaxation of a certain portion of this artery, or a morbid weakness of its coats, ought always to be considered, as a tumour formed by the distention, or dilatation of the proper coats of the artery itself, that is, of its internal and fibrous coats. Scarpa considers it quite demonstrable, that such aneurisms are produced by a corrosion and rupture of these tunics, and, consequently, by the effusion of arterial blood under the cellular sheath, or other membrane, covering the vessel. If ever there be a certain degree of preceding dilatation, it is not essential to constitute the disease; for it is not a constant occurrence, most aneurisms are unpreceded by it, and, in those rare cases, in which the aneurism is preceded and accompanied by a certain degree of dilatation of the whole diameter of the curvature of the aorta, there is an evident difference between an artery simply enlarged in diameter, and the capsule, which forms the aneurismal sac.

Dissections, carefully conducted, will shew, that the aorta contributes nothing to the formation of the aneurismal sac, and that this is merely the cellular membrane, which, in the sound state, covered the artery, or that soft cellular sheath, which the artery received in common with the neighbouring parts. This is raised by the blood into the form of a tumour, and is covered, in common with the artery, by a smooth membrane.

The Italian professor does not deny, that, from congenital relaxation, the proper coats of the aorta may not occasionally yield and become disposed to rupture; but he will not admit, that dilatation of this artery precedes and accompanies all its aneurisms, or that its proper coats ever yield so much to distention, as to form the aneurismal sac. The root of an aneurism of the aorta never includes the whole circumference of the artery; but, the aneurismal sac arises from one side in the form of an appendix, or tuberosity. On the contrary, the dilatation of the artery always occurs in its whole circumference, and, therefore, differs essentially from aneurism. Thus, there is really a remarkable difference between a dilated and an aneurismatic artery, although these two affections are sometimes found combined together, especially, at the origin of the aorta. If we also consider, that the dilatation of an artery may exist, without any organic affection, the blood being always in the cavity of the vessel; that in an artery so affected, there is never collected any grumous blood, or polypous layers; that the dilatation never forms a tumour of considerable bulk, and, that, while the continuity of the proper coats remain uninterrupted, the circulation of the blood is not at all, or not so sensibly changed, we shall be obliged to allow that aneurism differs essentially from the dilatation of an artery.

Galen, Œtius, Paulus, Actuarius, Haly, Albucasis, Oribasius, and Avicenna, who only treat of external aneurisms, speak of no other cases, than those by *effusion*; and, although some of these writers introduce the distinction, that external aneurisms are produced in three ways, viz. by *anastomosis*, by *diapædesis*, and by *diæresis*, they all affirm, that external aneurisms are invariably formed by the extravasation of blood under the skin. By *dilatation*, the Greek and Arabian physicians did not mean the expansion of the proper coats of the diseased artery; but, that tumour which the effused and coagulated arterial blood forms in the cellular membrane under the skin. Thus Œtius: *oritur dilatatio, aut dum sanguis, et spiritus ex arteriis prosultant; aut dum oscula ipsorum aperiuntur, aut dum rumpuntur. Sanguis autem et spiritus paullatim excreti sub cute colliguntur.* See also additional quotations in Scarpa from Actuarius, Silvaticus, &c.

Fernelius first published the theory of the dilatation of the coats of the arteries,

as the proximate cause of aneurisms, particularly, internal ones, arising from no evident causes. The theory of Fernelius, however, instead of being deduced from observations on the dead subject, was only the result of his own imagination, and false conjectures, that effused arterial blood would immediately putrify, and could never form, out of the vessels, a pulsating tumour. Sennertus, Hildanus, Barbette, and several others, rejected this theory, and were all convinced, that both internal and external aneurisms were formed by the rupture, and not by the dilatation of the internal coats of the artery.

Scarpa endeavours to demonstrate, by accurate dissections of arteries both in the sound and morbid state, what share the proper and constituent coats of the artery have in the formation of the aneurismal sac, and what belongs to the cellular covering, and other adventitious membranes surrounding the artery.

The covering of an artery is merely an adventitious sheath, which the vessel receives in common with the parts in the vicinity of which it runs. On cutting an rtery across in its natural situation, the segment of the cut vessel retires and conceals itself in this sheath.

This cellular covering is most evident round the curvature and trunk of the aorta, the carotid, mesenteric, and renal arteries; it is less dense round the trunk of the brachial, femoral, and popliteal arteries. The pleura lies over the cellular sheath of the arch of the aorta, and over that of the thoracic aorta; and that of the abdominal aorta is covered by the peritoneum. Both these smooth membranes adhere to, and surround, two-thirds of the circumference of the vessel. The great arteries of the extremities are not covered, in addition to the cellular substance, by any smooth membrane of this sort, but by a cellular sheath, which is demonstrably distinct from the adipose membrane, and serves to inclose the vessels, and connect them with the contiguous parts.

When air, or any other fluid, is injected by a small hole made artificially, between the cellular covering, and the subjacent muscular coat of the artery, the injected matter elevates into a tumour the cellular membrane, which closely embraces the artery, without properly destroying its cells, which it distends in a remarkable manner. When melted wax is injected, and pushed with much force, the cellular sheath of the artery is not only raised over the vessel, like a tumour, but, the internal cells of that covering, are also lacerated, and, on examining afterwards the capsule of the artificial tumour, it appears as if it were formed of several layers, rough and irregular internally, smooth and polished externally. The same thing happens, when any injection is pushed with such force into an artery, as to rupture the internal and muscular coats at some point of their circumference. Nicholls performed this experiment several times before the Royal Society. (*Philos. Trans. an.* 1728.) As soon as the internal coat is ruptured, the muscular one also gives way; but, the external cellular sheath, being of an interlaced texture, and the thin laminæ, of which it is composed, being not simply applied to one another, but, reciprocally intermixed, is capable of supporting great distention, by yielding gradually to the impulse of the blood, without being torn, or ruptured.

This celebrated professor is of opinion, that the same phenomena may be observed, when the internal coat of the aorta becomes so diseased, as to be ruptured by the repeated jets of blood from the heart. In this circumstance, the blood, impelled by the heart, begins immediately to ooze through the connexions of the fibres of the muscular coat, and gradually to be effused into the interstices of the cellular covering, forming, for a certain extent, a kind of *ecchymosis*, or *extravasation of blood*, slightly elevated upon the artery. Afterwards, the points of contact, between the edges of the fibres of the muscular coat being insensibly separated, the arterial blood, penetrating between them, fills and elevates, in a remarkable manner, the cellular covering of the artery, and raises it after the manner of an incipient tumour. Thus the fibres and layers of the muscular coat, being wasted, or lacerated, or simply separated from each other, the arterial blood is carried with great force, and in greater quantity, than before, into the cellular sheath of the artery, which it forces more outwards; and, finally, the divisions, between the interstices of the cellular coat being ruptured, converts it into a sac, which is filled with polypous concretions, and fluid blood, and at last forms, strictly speaking, the aneurismal sac. The internal texture, although apparently composed of membranes placed one over the other, is, in fact, very different from that of the proper coats of the artery, notwithstanding the injured vessel and aneurismal sac are both covered externally, in the thorax and abdomen, with a smooth membrane.

Scarpa has examined a considerable number of aneurisms, of the arch, and of the thoracic, and abdominal trunk, of the aorta, without finding a single one, in which the rupture of the proper coats of the artery was not evident, and in which, consequently, the sac was produced by a substance completely different from the internal and muscular coats.

The aneurismal sac never comprehends the whole circumference of the vessel. At the place where the tumour joins the side of the tube, the aneurismal sac presents a kind of constriction, beyond which it becomes more or less expanded. This would never happen, or rather the contrary circumstance would occur, if the sac were formed by an equable distention of the tube and proper coats of the affected artery. In incipient aneurisms, at least, the greatest size of the tumour would then be in the artery itself, or root of the swelling, while its fundus would be the least. But, whether aneurisms be recent and small, or of long standing and large, the passage from the artery is always narrow, and the fundus of the swelling greater in proportion to its distance from the vessel. The sac is always covered by the same soft dilatable cellular substance, which united the artery in a sound state to the circumjacent parts. Such cellular substance, in aneurisms of the thoracic aorta, is covered by the pleura, and, in those of the abdominal aorta, by the peritoneum, which membranes include the sac and ruptured artery, presenting outwardly a continued smooth surface, just as if the artery itself were dilated. But, if the aorta be opened lengthwise on the side opposite the constriction, or neck of the tumour, the place of the ulceration, or rupture, of the proper coats of the artery, immediately appears within the vessel, on the side opposite to that of the incision. The edge of the fissure, which has taken place, is sometimes fringed, often callous, and hard, and through it it was, that the blood formed itself a passage into the cellular sheath, which is converted into the aneurismal sac. If, as sometimes happens, in the arch of the aorta near the heart, the artery, before being ruptured, has been somewhat dilated, it seems, at first, as if there were two aneurisms; but, the constriction, which the sac next to the artery, presents externally, points out exactly the limits, beyond which the internal and muscular coats of the aorta had not been able to resist the distention, and where of course they have been ruptured. The partition, which may always be seen dividing the tube of the artery from the aneurismal sac, and which is lacerated in its middle, consists of nothing else than the remains of the internal and muscular coats of the ruptured artery.

By carefully dissecting the proper coats of the ruptured aorta in its situation, and comparing them with the cellular substance forming the sac, the truth of the preceding statement may be indisputably demonstrated.

When an incision is made lengthwise in the side of the vessel opposite the rupture, its proper coats are found either perfectly sound, or a little weakened and studded with earthy points, but, still capable of being separated into distinct layers. On the contrary, in the opposite side of the aorta, where the rupture is, the proper coats are unusually thin, and are only separable from each other with difficulty, or even not at all; they are frequently brittle, like an egg-shell, and are disorganised and torn at the place where they form the partition between the ruptured artery and the mouth of the aneurismal sac. Continuing to separate these coats, from within outwards, we arrive at the cellular sheath surrounding the aorta. This sheath being much thickened in large aneurisms, and very adherent to the subjacent muscular coat of the artery at the place of the constriction of the sac, is very apt to be mistaken for a dilated portion of the vessel itself. But, even in such cases, we may at last separate it, without laceration, from the tube of the artery, above and below the injury, and, successively, from the muscular coat, as far as the neck of the aneurism. Then it is clear, the muscular coat does not pass beyond the partition, separating the cavity of the artery from that of the aneurismal sac, over which it is not prolonged, but terminates at the edge of the rupture like a fringe, or in obtuse points. Errors are rendered more apt to occur, in consequence of the aorta and sac being both covered by the pleura, or peritoneum.

The portion of the aorta, within the pericardium, being only covered by a thin reflected layer of this membrane, such layer may also be lacerated, when the proper coats give way, and blood be effused into the cavity of the pericardium. Examples of this kind are related by Walter, Morgagni, &c. and Scarpa himself. In the latter instance, on making an incision into the concave part of the aorta, opposite the tumour which had formed under the layer of the pericardium, which had also burst by a small aperture, its internal coat, corresponding to the base of the swelling, was quite rough, interspersed with yellow hard spots, and actually ulcerated for the space of an inch in circumference. The preparation is preserved in the museum at Pavia.

But all other parts of the aorta having, between them and the pleura and peritoneum, a cellular sheath of a stronger and more yielding nature, which allows itself to be distended into a sac, and being strengthened internally, by polypous layers, and, externally, by the pleura or peritoneum, oppose for a long while the fatal effusion of blood.

Scarpa believes, that what he calls the slow, morbid, steatomatous, fungous,

squamous, degeneration of the internal coat of the artery is more frequently the cause of its bursting, than violent exertions of the whole body, blows, or an increased impulse of the heart. This kind of diseased change is very common in the curvature, and thoracic and abdominal trunks, of the aorta. In the incipient state of such disease, the internal coat of the artery loses, for a certain space, its beautiful smoothness, and becomes irregular and wrinkled. It afterwards appears interspersed with yellow spots, which are converted into grains, or earthy scales, or into steatomatous, and cheese-like concretions, which render the internal coat of the artery brittle and so slightly united to the adjoining muscular coat, that, upon being merely scratched with the knife, or point of the nail, pieces are readily detached from it, and, on being cut, it gives a crackling sound, similar to the breaking of an egg-shell. This ossification cannot be said to be proper to old age, since it is sometimes met with in subjects not much advanced in life. The whole of the side of the artery, in that part which is occupied by the morbid affection, is, for the most part, hard and rigid, sometimes soft and fungous, and, in most cases, the canal of the artery is preternaturally constricted. In the highest degree of this morbid disorganization, true ulcerations are found on the inside of the artery, with hard and fringed edges, fissures, and lacerations of the internal and fibrous coats of the artery.

Whenever an aneurismal sac of an immoderate size beats violently, and, for a long while against a bone, as the sternum, ribs, clavicle, and vertebræ, the bones are in the end invariably corroded, so that the aneurismal sac elevates the integuments of the thorax, or back, and pulsates immediately under the skin. Scarpa, with the best modern writers, attributes the effect to absorption, in consequence of the pressure.

Having presented the reader with an abridged account of the most important remarks, made by Scarpa, in support of the doctrine he defends, we now annex his conclusions. 1. That this disease is invariably formed by the rupture of the proper coats of the artery. 2. That the aneurismal sac, is never formed by a dilatation of the proper coats of the artery, but, undoubtedly, by the cellular sheath, which the artery receives in common with the parts contiguous to it; over which cellular sheath the pleura is placed in the thorax, and the peritoneum in the abdomen. 3. That if the aorta, immediately above the heart, appears sometimes increased beyond its natural diameter, this is not common to all the rest of the artery, and when the aorta, in the vicinity of the heart, yields to a dilatation greater than natural, this dilatation does not constitute, properly speaking, the essence of the aneurism. 4. That there are none of those marks regarded by medical men as characteristic of aneurism from *dilatation*, which may not be met with in aneurism from *rupture*, including even the circumscribed figure of the tumour. 5. That the distinction of aneurism into *true* and *spurious*, adopted in the schools, is only the production of a false theory; since observation shews, that there is only one form of this disease, or that caused by a rupture of the proper coats of the artery, and an effusion of arterial blood into the cellular sheath, which surrounds the ruptured artery. (See *Treatise on Aneurism, by A. Scarpa, translated by J. H. Wishart. Edinb.* 1808.)

Even the believers in the doctrine of dilatation, will, I think, now agree with Sabatier, that, in what they call true aneurisms, the internal coats of the artery, that is to say, the cuticular and muscular coats, are mostly ruptured, while that which is called cellular, or elastic, is dilated, so as to form the pouch, in which the blood is contained. This, he says, is particularly apt to be the case, when these swellings are the consequence of some exertion or violent shock. The generality of modern surgical authors, by whom the true aneurism, attended with a real dilatation of all the coats of the artery, is implicitly believed, universally admit, that, when such a tumour has acquired a large size, the inner coats of the vessel, which are imagined to be dilated, may give way and be ruptured. The blood, forcibly impelled into the vessel, or tumour, is described as producing a laceration of the resisting coats, becoming effused within the cellular coat, which is very elastic, occasioning a separation of this tunic from the others, and collecting within it in a more or less considerable quantity. "I have found this proved," says Sabatier, "in nearly all the aneurisms which I have seen dissected, as well as in those, which I have examined myself, but, particularly, in a subject, whose carotids I was about to inject. In endeavouring to expose these vessels, I found a large quantity of blood extravasated in the adjoining cellular substance. As they appeared to me to be larger than ordinary, my curiosity was excited, and I traced them to the aorta, which was extremely dilated, as was likewise the pericardium. The deep livid colour of this latter membrane shewed, that there was an accumulation of blood in its cavity. In fact, a large quantity was found there, and the portion of the aorta, included within this membrane, was much enlarged. I soon

perceived a considerable rent, which led into the cavity of the vessel, and, on this opening being made larger, I found, that the aorta began to be dilated at its origin from the heart, and that the increased size, which it had acquired, extended to the curvature, and the vessels arising there; that these arteries were contained in a kind of continuous sac, which had borrowed their form, though its width was greater; that they appeared to be stripped of their cellular covering, just as if they had been dissected for anatomical purposes; and, lastly, that it was the aorta itself, which was rent, a little way from the opening, that had taken place in its membranous covering within the pericardium. Similar cases are recorded by Morgagni, and others." (*Sabatier, op. cit. p.* 165, 166.)

Richerand does not altogether reject the doctrine of a dilatation of all the arterial coats; but, he asserts that this is only the case when the tumour is small and incipient, while, in aneurisms of a certain size and standing, two out of the three coats, which compose the parietes of the artery, namely, the internal and middle tunics, are constantly lacerated. (*Nosographie Chirurgicale, Tom.* 4. *p.* 81. *Edit.* 2.)

According to Sabatier, true aneurisms most frequently occur in the abdomen and thorax. Here, there are no pathognomonic signs, by which the existence of such swellings can be known with certainty, before the disease is sufficiently large to be felt externally; for, the symptoms produced differ according to the situation of the tumour, and are very like those of numerous other diseases, so that it is impossible to ascribe the complaints to this or that particular affection. Sometimes, the train of circumstances, which accompany aneurisms, joined with the patient's complaining of a strong throbbing in the situation of the disease, may lead to a suspicion of the nature of the case, even before the tumour can either be felt, or seen. When, however, true aneurisms are situated in the neck, or the extremities, they may easily be known by the ease, with which they yield to pressure, and by their pulsations; but the last symptoms may disappear, when the tumour has become exceedingly large.

The greater number of aneurisms increase gradually, and sooner or later incline to the side, on which the least resistance is experienced. De Haen mentions an aneurism, of the aorta, which first made its appearance between the second and third ribs of the left side, and, which instead of growing larger, as is usual, subsided, and could neither be seen, nor felt, for more than a month before the patient's decease, although, on opening the body, a tumour of the arch of the aorta was found, three times as large as the first. De Haen imputes the sudden disappearance of the swelling to its weight, the yielding of the parts with which it was connected, and to its gravitating into the chest, when the patient lay on his right side; for, the difficulty of breathing, and other complaints, produced by the pressure on the lungs, underwent a material increase, as soon as the tumour ceased to protrude.

The pulsations, which accompany true aneurisms, continue to be strong, until the inner coats of the vessel give way, or the layers of coagulated blood, lodged in the sac, are numerous. Hence, when soft swellings, situated near any large arteries, lose their pulsatory motion, their course, precise situation, and other circumstances, ought to be most carefully investigated, before the surgeon ventures to make an opening. In many instances, the most fatal accidents have happened, in consequence of incisions having been made into aneurisms, which were mistaken for abscesses, because there was no pulsation. Vesalius was consulted about a tumour of the back, which he pronounced to be an aneurism. Soon afterwards, an imprudent practitioner made an opening in the swelling, and the patient bled to death in a very short time. Ruysch relates, that a friend of his, having opened a tumour near the heel, which was not supposed to be an aneurism, the greatest difficulty was experienced in suppressing the hemorrhage. De Haen speaks of a patient, who died in consequence of an opening, which was made into a similar swelling at the knee, although Boerhaave had given his advice against the performance of such an operation. Palfin, Schlitting, Warner, and others, have recorded mistakes of the same kind. (*Sabatier, Tom.* 3, *p.* 167.) Richerand informs us, that Ferrand, head surgeon of the Hôtel-Dieu, mistook an axillary aneurism for an abscess, plunged his bistoury into the swelling, and killed the patient. "*J'ai été témoin d'erreurs semblables, commises par des praticiens non moins fameux; et si des anévrismes externes on passe à ceux des artères placées à l'intérieur, les erreurs ne sont ni moins ordinaires ni de moindre consequence.*" (*Nosographie Chirurgicale, Tome* 4, *p.* 75. *Edit.* 2.)

Notwithstanding a pulsation is one of the most prominent symptoms of an aneurism, it is not to be inferred, that every swelling which pulsates is unquestionably of this description; for, as Mr. Warner has explained, "it does happen, that mere imposthumations, or collections of matter, arising from external as well as internal causes, are sometimes so immediately situated upon the heart it-

self, and, at other times, upon some of its principal arteries, as to partake, in the most regular manner, of their contraction and dilatation.

"A few years ago," says he, "I saw an instance of a boy, about thirteen years of age, who had his breast-bone much fractured by a fall; on this account, he was admitted into Guy's Hospital; but, not till a fortnight after the accident had happened.

"Upon examination, there was an evident separation of the broken parts of the bone, which were removed some distance from each other. The intermediate space was occupied by a tumour of a considerable size; the integuments were of their natural complexion. The swelling had as regular a contraction and dilatation as the heart itself, or the aorta could be supposed to have. Upon pressure, the tumour receded; upon a removal of the pressure, the tumour immediately resumed its former size; all these are allowed to be distinguishing signs of a recent true aneurism. The situation and symptoms of this swelling were judged sufficient reasons for considering the nature of the disease as uncertain: on which account it was left to take its own course.

"The event was, the tumour burst in about three weeks after his admission; discharged a considerable quantity of matter; and the patient did well by very superficial applications." (*Cases in Surgery, by Joseph Warner, F.R.S. Edit.* 4, *p.* 155.)

A few years ago, I saw a large abscess in the situation of the quadratus lumborum muscle, which pulsated so strongly, that the case was supposed by several experienced men to be an aneurism of the abdominal aorta. The patient was a boy, belonging to Christ's Hospital, and under the care of Mr. Ramsden, surgeon to that establishment, by whose discernment the real nature of the case was detected. It is curious, that, in this instance, the pulsations of the swelling suddenly ceased, after having continued in a very strong and manifest way, and without interruption, for several weeks, during which it was under the observation of the above eminent practitioner.

The following case, recorded by Pelletan, shews, that an artery running more superficially, than natural, may, under particular circumstances, give rise to the suspicion of an aneurism. A strong robust man, about forty years of age, was in the habit of going on foot to dine three leagues from Paris, every day, on the completion of his business. One day, having been this distance, and returned, he felt an acute pain along the leg, and in the right ankle. The pain did not subside, and a tumour appeared at the lower third of the leg, opposite the space between the two bones. The skin was of a yellowish colour from effused blood, and a pulsation existed, by which the hand of an examiner was lifted up. There seemed every reason for concluding that the case was an aneurismal swelling. In comparing the affected limb with the sound one, however, Pelletan perceived in the latter a similar kind of throbbing. In short, in both legs, the pulsation of an arterial tube could be felt for three inches, and, Pelletan distinctly ascertained, that, in the diseased member, the throbbing did not extend to the whole of the tumour, but only lengthwise. By a particular disposition in this individual, the anterior tibial artery, which usually runs along the interosseous ligament, covered by the tibialis anticus, and extensor communis digitorum pedis, came out from between these muscles, at the middle of the leg, and lay immediately under the skin and the fascia. The patient, curious about the circumstance, which had been mentioned to him, examined the legs of the whole of his family; and it appeared, that his daughter was the only one, in whom the anterior tibial artery ran directly under the skin, in the same way, as it did in himself.

By confining the patient to his bed, says Pelletan, we were soon convinced, that the disease was not an aneurism; for the swelling and ecchymosis were gradually dispersed, and, it is more than probable, that the symptoms originated from the rupture of some muscular fibres, in the exertion of walking so great a distance. (See *Pelletan's Clinique Chirurgicole, Tome* 1, *p.* 101, 102.)

According to Richerand, when an aneurism is recent and of small size, the dissection of the tumour exhibits a simple dilatation of the arterial coats; while, in other cases, where the aneurism is large, and has existed a considerable time, the internal and middle coats of the vessel, are invariably lacerated. In the early stage of the disease, the blood, which fills the aneurismal sac, is fluid, and, on the contrary, in cases, where the internal tunics of the artery are ruptured, the sac contains more or less coagulated lymph. The external, or cellular coat composes the greater part of the cyst; and the coagulating lymph, with which it is filled, is arranged in layers, the density of which is described as being greater, in proportion to the length of time, which they have been deposited. Such as are nearest the sac are, therefore, represented as being most compact, and containing the smallest quantity of the colouring matter of the blood; more deeply the concretions of lymph resemble simple co-

águla; and, lastly, the blood, which is still nearer the arterial tube, retains its fluidity.

After the aneurismal sac has been cleansed from the lymph and coagulated blood, which it contains, its parietes will appear to be almost entirely formed of the cellular coat of the artery. Towards the bottom may be observed the aperture, arising from the laceration of the internal and middle coats, which, being much less elastic than the external, are ruptured in an early stage of the disease. It is when these two tunics give way, that the aneurismal tumour undergoes a sudden and considerable increase in its size; for, then, the cellular coat alone has to sustain all the pressure of the blood, which, now becoming effused into a more ample cyst, loses a great deal of its impetus, coagulates, and forms fibrous masses; circumstances to which may be ascribed the hardness of the swelling, the weakness of its pulsation, &c.

The aneurisms, which get well spontaneously, are so few, that this disease, when left to itself, may be regarded as generally fatal. But, nothing is subject to more variety, than its duration in different cases, the tumour bursting sooner or later, according as the patient happens to lead a life of labour, or ease, of intemperance, or moderation. Even the bursting of an internal aneurism may not immediately kill the patient, as the following uncommon instance proves: a stonecutter died in the hospital Saint Louis, with an enormous aneurism, situated on the left side of the lumbar vertebræ. The body was opened by Richerand, who found, that the external tumour consisted of blood, which had been effused into a cyst, that was formed in the midst of the cellular substance of the loins. This fluid had passed into the situation specified, by making its way through the muscles. The track, through which it came, led into another aneurismal sac, contained in the abdomen, and situated behind the peritoneum, on the left side of the lumbar vertebræ. In endeavouring to discover, whence the extravasated blood proceeded, Richerand found, that the abdominal aorta was entire, though in contact with the swelling. The original affection consisted of an aneurismal dilatation of the inferior portion of the thoracic aorta, which had burst at the point, where it lies betwixt the crura of the diaphragm. The blood had probably escaped very slowly, and it had accumulated in the cellular substance, which surrounds the kidney, so that three cysts burst successively, before the patient died. (See *Richerand's Nosographie Chirurgicale, Tom.* 4, *p.* 82, *Edit.* 2.)

Aneurisms frequently destroy the bones with which they come into contact. There is perhaps hardly any surgeon who has not had many opportunities of seeing aneurismal swellings in the chest, forming an external protrusion, in consequence of the absorption of the ribs and sternum, or projecting backward against the spine, so as to occasion the destruction of the substance of the vertebræ, to a greater or lesser degree. There are few practitioners, who have not seen the lower part of the os femoris rendered carious by the pressure of large popliteal aneurisms.

The following case, related by Pelletan, is highly interesting, not only in exemplifying the degree, in which aneurismal swellings may injure the vertebræ; but also in shewing the liability of such tumours to be mistaken, for other diseases, and the enormous size, which they sometimes attain.

Francis Gensy was a robust healthy man, until the year 1803, when he met with a fall from his horse. From this period, he lost his usual gaiety and vivacity. Some time afterwards, he contracted the venereal disease, and put himself under the care of a quack. In 1805, supposing himself cured, he married. He had now become more dull, sorrowful, and pensive, than ever, and complained of pain about the kidneys, which he imputed to rheumatism. Last August, he was attacked with an intermittent fever, which readily yielded to suitable remedies. The following November, his horse fell down with him, and he communicated the accident to nobody; but, the pain about his kidneys became much more severe. It was not till the fourth of last March, that he consulted M. Deguise, a distinguished surgeon, belonging to the hospital at Charenton. Gensy complained of an acute pain in the left hip, which he described as shooting across the pelvis. As this circumstance caused rheumatism to be suspected, a blister was applied, which produced temporary relief, but was afterwards followed by convulsions of the whole body. Antispasmodics were prescribed with some success; yet, the tongue became dry, the belly tender, the pulse quick and small, the sleep uneasy, and the loins more painful than ever. Attempts were made to procure the patient relief by putting him repeatedly in the warm bath; but, this plan being annoying to him, it was relinquished. He suffered acute pain in the abdomen, and his nights were very bad. At length, on the 15th of the following April, an oval tumour, that was imperfectly circumscribed, made its appearance in the right iliac region, in the track of the psoas muscle. It presented a distinct fluctuation, and it might easily have been mistaken for a collection of

matter depending, says Pelletan, on a caries of the vertebræ, the cause of which could have been referred to the venereal disease, of which mention has been made. But on an attentive examination, pulsations were felt, which, as they increased from day to day, left no further doubt, concerning the nature of the swelling. It was at this period, that Pelletan was called into consultation with M. Deguise. The patient was now much emaciated; his pulse was scarcely perceptible; and his debility was extreme. Pelletan saw, that the disease was an aneurism, and could not but forebode the death of the patient. The deformity of the lowest dorsal vertebræ, where the centre of the pain lay, might have contributed to the idea of the case being a lumbar abscess with caries, had it not been known, that the enlargement of aneurisms may destroy the bodies of the vertebræ, as well as any other bone, which happens to be in the vicinity of the disease. The patient lived only ten days after Pelletan's visit.

On opening the body, an aneurismal tumour of prodigious size was discovered. It filled the cavity of the abdomen, from the lumbar and iliac regions of the right side, to the lumbar region of the left side, and it extended from the trunk of the cœliac artery down to the bifurcation of the aorta, into the two iliac arteries. The trunk of the aorta divided the tumour into two pouches, of which the right was far the largest, occupying the iliac and lumbar regions. The swelling enveloped the right kidney, and was externally covered with the peritoneum, which membrane was pushed to some distance from the bowels. The quantity of blood, which the aneurism contained, was about five pints; three of which were in its right cavity, and two in its left. This fluid was nearly all in a coagulated state, the coagula being arranged in concentric layers, as is usual in such cases. The centre of the disease presented an oval opening, about three inches long, and one broad, formed in the posterior part of the aorta, between the cœliac and superior mesenteric arteries. Opposite to this aperture, the bodies of the two last dorsal, and of the two first lumbar vertebræ, were destroyed; an ordinary effect of aneurims on such bones as happen to be near them, but, which effect Pelletan had never previously seen take place in so considerable a degree. The two cavities of the chest contained a large quantity of bloody serum, which had no connexion with the aneurism, and the lungs were sound.

Pelletan says, he never met with so large an aneurism; he thinks it probable, that it was brought on by the fall, which the patient met with in 1803, and that it had been increasing for six years. He states, that the man died from nearly the whole mass of the blood having passed into the aneurismal sac, most of the vessels, and the heart itself, being in fact quite empty.

However, the most interesting circumstance in this case, with regard to practice, was the resemblance, which the apparent symptoms of this aneurism bore to those of a lumbar abscess, with, or, without a caries of the vertebræ. (See *Pelletan's Clinique Chirurgicale, Tom.* 1, *p.* 97—100.)

Aneurisms often seem to originate spontaneously, it being in many instances exceedingly difficult to assign any cause for the commencement of the disease. Among the circumstances, which predispose to aneurisms, however, the large size of the vessels may undoubtedly be reckoned. Those trunks, which are near the heart, are said to have much thinner parietes, in relation to the magnitude of the column of blood, with which they are filled, than the arteries of smaller diameter; and since the lateral pressure of this fluid against the sides of the arteries, is in a ratio to the magnitude of these vessels, it follows, that aneurisms must be much more frequent in the trunks near the heart, than in such as are remote from the source of the circulation. (*Richerand, Nosographie Chirurgicale, Tom.* 4, *p.* 72, *Edit.* 2.) The whole arterial system is liable to aneurisms; but, says Pelletan, experience proves, that the internal arteries are much more frequently affected, than those which are external. (*Clinique Chirurgicale, Tom.* 1, *p.* 54.)

The curvatures of the arteries are another predisposing cause of the disease, and, according to Richerand, such cause has manifest effect in determining the formation of the great sinus of the aorta, the dilatation, which exists between the cross and the origin of this large artery, and is the more considerable, the older the person is. Monro rightly observes on this subject, that one half of old persons have an aneurism at the beginning of the aorta.

There is one artery of moderate size, without any curvature, which is nevertheless more subject to aneurism, than other vessels of much larger diameter: the popliteal artery is that, which is here alluded to. The crural, of which this last is only the continuation, is much less commonly affected. This frequency of aneurisms of the popliteal artery does not depend upon the vessel being situated in the middle of a very extensible cellular substance; for, the crural, at its upper third, is not better supported by the surrounding parts. The

cause is imputed by Richerand to the situation of the artery in the ham, at the back of the knee joint, an articulation, of which the extension is only limited by the resistance of such tendons, ligaments, and soft parts, as are placed behind it. In the stretching, to which all the parts behind the joint are subjected, when the leg is forcibly extended on the thigh, the artery, whose texture is the slightest, is particularly apt to be lacerated. Richerand affirms, that, out of twelve popliteal aneurisms, which he has seen, either in hospital, or private practice, ten have been caused by a violent extension of the leg. This statement, he says, will derive confirmation from the following experiments:

Place the knee of a dead subject on the edge of a firm table, and press on the heel, so as forcibly to extend the leg far enough to make the ligaments of the ham snap. Now dissect the part, cut out the artery, and examine its parietes in a good light, when the lacerations of the middle coat will be observable, and rendered manifest by the circumstance of those places appearing semitransparent, where the fibres are separated, the parietes at such points merely consisting of the internal and external tunics. (*Nosographie Chir. Tom.* 4, *p.* 73, 74, *Edit.* 2.)

The implicit belief, however, which Richerand seems to place in the idea, that the laceration of the middle coat of an artery will bring on an aneurism, while the inner coat is perfect, will appear to be unfounded, when it is remembered, that Hunter and Home even dissected off the external and middle coats of arteries, without being able in this manner to cause an aneurism.

Pelletan accounts for the frequency of popliteal aneurisms somewhat differently from Richerand: speaking of the two principal motions of the knee, viz. extension and flexion, he remarks, that the first of these is so limited, that it is actually an incipient flexion, necessarily produced by the curvature backward both of the condyles of the femur, and those of the tibia. This curvature, which would seem to protect the popliteal artery against any dangerous elongation, that might otherwise be caused by a forcible extension of the joint, becomes the very source of such an elongation in persons, who are accustomed to keep their limbs bent, or, who, from this state, proceed hastily and violently to extend the leg. The arterial tubes are really shortened, when the limbs are in the state of flexion, and lengthened, when the extension of the members renders it necessary. Hence, says Pelletan, it is manifest, that an habitual shortened state of these vessels, and their sudden elongation, must be attended with hazard of rupturing their parietes. (*Clinique Chirurgicale, Tom.* 1. *p.* 112.)

Aneurisms are exceedingly common in the aorta, and they are particularly often met with in the popliteal artery. The vessels, which are next to these the most usually affected, are the crural, common carotid, subclavian, and brachial arteries. The temporal and occipital arteries, and those of the leg, foot, forearm, and hand, are far less frequently the situations of the present disease. But, although it is true, that the larger arteries are the most subject to the ordinary species of aneurisms, the smaller arteries seem to be more immediately concerned in the formation of one peculiar aneurismal disease, now well known by the name of the *aneurism by anastomosis*, of which I shall hereafter speak.

According to surgical writers, the causes of aneurisms operate either by weakening the arterial parietes, or by increasing the lateral impulse of the blood against the sides of these vessels. It is said to be in both these ways, that the disease is occasioned by violent contusions of the arteries, the abuse of spirituous drinks, mercurial courses too often repeated, fits of anger, rough exercises, exertions in lifting heavy burdens, &c. In certain persons, aneurisms appear to depend upon a particular organic disposition. Of this description was the subject, whose arteries, on examination after death, were found by Lancisi affected with several aneurisms of various sizes. I have known a person, who had an aneurism of one axillary artery, which disease got spontaneously well, but, was soon afterwards followed by a similar swelling of the opposite axillary artery, which last affliction proved fatal. I have seen another instance, in which an aneurism of the popliteal artery was accompanied with one of the femoral in the other limb. The most remarkable case, however, proving the existence of a disposition to aneurisms in the whole arterial system, is mentioned by Pelletan. "J'ai pourtant vu plusieurs fois ces nombreux aneurismes occupant indistinctement les grosses ou les petites artères, mais sur-tout celles des capacités; *j'en ai compté soixante-trois sur un seul homme, depuis le volume d'une aveline jusqu' à celui de la moitié d'un œuf de poule.* (*Clinique Chirurgicale, Tom.* 2, *p.* 1.)

In this country it has been noticed, that popliteal aneurisms occur with particular frequency in postilions and coachmen, whose employments oblige them to sit a good deal with the knees bent. It has been observed in France, by Richerand, that the men, who clean out the dissecting rooms, and procure dead bodies for anatomists, almost all die of aneurismal

diseases. This author remarks, that he never knew any of these persons, who were not addicted to drinking, and he comments on the debility, which their intemperance and disgusting business together must tend to produce. (*Nosographie Chirurgicale, Tom.* 4, *p.* 74, *Edit.* 2.)

Aneurisms of the axillary artery appear, in some instances, to have arisen from violent extension of the limb. (See the cases recorded by Pelletan in *Clinique Chirurgicale, Tom.* 2, *p.* 49, and 83.) In other examples, related by the same interesting practical writer, aneurisms arose from reiterated contusions and rough pressure on parts. (*Op. cit. p.* 10, *p.* 14.)

The extremity of a fractured bone may injure an artery, and give rise to an aneurism, an instance of which is recorded by Pelletan. (*Op. cit. Tom.* 1. *p.* 178.) The disease followed a fracture of the lower third of the leg. An aneurism of the anterior tibial artery, from such a cause, is also described in Mr. *Charles White's Cases in Surgery, p.* 141.

The following case of an aneurism of the humeral artery, after amputation, is recorded by Warner: C. D. was afflicted with a caries of the joint of the elbow, which was attended with such circumstances, as rendered the amputation of the limb necessary. The operation was performed at a proper distance above the diseased part, and the vessels were taken up by the needle and ligatures.

In a few days, after the operation, the humeral artery became so dilated above the ligature as to endanger its bursting. Upon this account, it was judged necessary to perform the operation for the aneurism, which was done, and the vessel was secured by ligature, above the upper extremity of its distended coats. After this operation, every thing went on, for some time, exceedingly well, when suddenly the artery appeared again dilated, and was in danger of bursting above the second ligature. These circumstances made it necessary to repeat the operation for the aneurism. From this time, every thing went on successfully, till the stump was at the point of being healed; when, quite unexpectedly, the artery appeared a third time diseased in the same manner as before; for which reason, a third operation for aneurism was determined on, and performed.

The last operation was near the axilla. The patient continued well, from this time, without any relapse.

Query. Could the several aneurisms of the humeral artery, (says Mr. Warner) be attributed to the sudden check alone, which the blood met with from the extremity of the vessel being secured by ligature; or is it not more reasonable to suppose, that the coats of the artery, nearly as high up as the axilla, were originally diseased and weakened? The latter, in the opinion of this judicious writer, seems the most probable way of accounting for the successive returns of the disease of the vessel; since it is found from experience, that such accidents have been very rarely known to occur after amputations, either of the arm, or thigh, where nearly the same resistance must be made to the circulation in every subject of an equal age and vigour, who has undergone the like operation.

If it should be supposed, that the several dilatations of the coats of the vessels, continues Mr. Warner, arose merely from the check in the circulation, it will not be easy to account for the final success of this operation; and, especially, when we reflect, that the force of the blood is increased in proportion to its nearness to the heart. (See *Cases in Surgery, by J. Warner, F. R. S. p.* 139, 140, *Edit.* 4.)

Aneurisms sometimes follow the injury, which a large artery suffers in gunshot wounds. The passage of a bullet through the thigh, in one example, gave rise to a femoral aneurism. (See *the Parisian Chirurgical Journal, Vol.* 2, *p.* 109.)

TREATMENT OF ANEURISMS IN GENERAL.

A complete cure of an aneurism cannot be effected, in whatever part of the body the tumour is situated, unless the artery, from which the aneurism is derived, be, by nature or art, obliterated and converted into a perfectly solid, ligamentous substance, for a certain extent above and below the place of the ulceration, laceration, or wound. When aneurisms are cured by compression, the cure is never accomplished, as some have supposed, by the pressure strengthening the dilated proper coats of the artery, and restoring, especially to the muscular coat, the power of propelling the blood along the tube of the artery, as it did previously to its *supposed dilatation*. M. Petit, and Foubert thought, that the natural curative process sometimes consisted in a species of clot, which closed the laceration, ulceration, or wound of the artery, and resisted the impulse of the blood, so as still to preserve the continuity of the coats of the artery, and the pervious state of the vessel. Haller imbibed a similar sentiment, from experiments made on frogs.

That a punctured artery may occasionally be healed in this manner, Scarpa proves by a case which he examined, in which an aneurism took place from the wound of a lancet in bleeding. In the article *Hemorrhage* we shall see, that Jones's experiments shew the same thing, and the particular circumstances in

which it may happen. But, the occurrence is excessively rare, and can hardly be called a *radical* cure, as the cicatrix is always found in a state ready to burst and break, if the arm is, by any accident, violently stretched or struck, where the wound was situated.

Whenever the ulcerated, lacerated, or wounded artery, is accurately compressed against a hard body, like the bones, it ceases to pour blood into the surrounding cellular sheath, because its sides, being kept in firm contact, for a certain extent, above and below the breach of continuity, become united by the adhesive inflammation, and converted into a solid, ligamentous, cylinder. Molinelli, Guattani, and White, have given examples and plates, illustrative of this fact. When aneurisms get well spontaneously, the same fact is observed after death, as Valsalva, Ford, &c. have demonstrated. I have myself seen in St. Bartholomew's Hospital, an instance, in which a man had had a spontaneous cure of an aneurism in the left axilla, but afterwards died of hemorrhage from another one under the right clavicle; the artery on the left side was found completely impervious. My friend, Mr. Albert, had under his care, in the York Hospital, Chelsea, a dragoon, who recovered spontaneously of a very large aneurism of the external iliac artery: the tumour sloughed, discharged about two quarts of coagulated blood, and then granulated and healed up. Paoli relates a similar termination of a popliteal aneurism. Moinichen and Guattani, relate other examples. Hunter found the femoral artery quite impervious, and obliterated, at the place where a ligature had been applied fifteen months before. Boyer noticed the same fact in a subject, eight years after the operation. Petit relates a spontaneous cure of an aneurism at the bifurcation of the right carotid, and the subject having afterwards died of apoplexy, the vessel on dissection, was found closed up and obliterated from the bifurcation, as far as the right subclavian artery. Desault had an opportunity of opening a patient, in whom a spontaneous cure of a popliteal aneurism was just beginning; he found a very hard, bloody thrombus, which extended for three finger-breadths, within the tube of the artery, above the sac, and was so firm, as to resist injection, and make it pass into the collateral branches.

Both the spontaneous and surgical cures of aneurisms, have two stages; in the first, the entrance of the blood into the aneurismal sac is interrupted; in the second, the parietes of the artery approach each other, and, becoming agglutinated, the vessel is converted into a solid cylinder. This doctrine is corroborated by the tumour first losing its pulsation, and then gradually diminishing and disappearing. Dr. Thomson, as well as Scarpa, has long expressed his opinion, that the spontaneous radical cure of aneurisms, may sometimes arise from the pressure of the aneurismal sac on the trunk of the injured artery, just above the communication between the vessel and the cavity of the aneurism. Morand proved that a violent blow may lead to the obliteration of an artery, and Dr. Jones has demonstrated, that arteries always become impervious, after having a tight ligature put round them, even though such ligature be removed the moment after its application.

When an aneurism is affected deeply by gangrene, a dense, compact, bloody, coagulum is formed within the vessel, shutting up its canal, and interrupting completely the course of the blood. Hence the sphacelation which follows, and the bursting of the integuments, and of the aneurismal sac, are never accompanied by a fatal hemorrhage, and the patient is cured of the gangrene and the aneurism, if he has strength sufficient to resist the destructive action of the sphacelus on the constitution. When a patient dies of hemorrhage, after the mortification of an aneurism, it is because only a portion of the integuments and sac has sloughed, without the root of the aneurism, and, especially, the arterial trunk, being in this way affected.

In order that compression may make the opposite sides of an artery unite, and thus produce a radical cure of an aneurism, Scarpa says, the degree of pressure must be such as to place these opposite sides in firm and complete contact, and such as to excite the adhesive inflammation in the coats of the artery, which must also possess a state of vitality, presently to be noticed. The point of compression must also fall above the laceration, or wound of the artery; for, when it operates below, it hastens the enlargement of the tumour; and Scarpa adds, that, in practice, bandages, which are expulsive and compressive, are more useful for making pressure, than any tourniquets or instruments, many of which are contrived to operate, without retarding the return of blood through the veins.

For pressure to succeed, the coats of the vessel must possess, at the place where it is made, such a degree of vitality, as to be capable of feeling the stimulus, and of inflaming. When the arterial coats, round the root of the aneurism, are diseased, as above described, they are insusceptible of the adhesive inflammation, although compressed together in the most scientific manner, and, even

when tied with a ligature, which only acts by making circular pressure on the vessel.

Some advise trying compression in every case of aneurism, whether small, circumscribed, soft, flexible, indolent, or elevated, diffused, hard, and painful. In the latter case, however, compression is hurtful. Every bandage, which compresses the aneurism, and also constricts circularly the affected part, is always injurious. The bandage, likewise, which, compressing only the aneurism, directs the point of pressure below the rupture in the vessel; that which, on account of the great size, exquisite sensibility, depth of the root, of the aneurism, and fleshiness of the surrounding parts, cannot effectually compress the artery against the bones, so as to bring the opposite sides of the vessel into contact; and, lastly, the compression applied to a spontaneous aneurism, attended with a steatomatous, ulcerated, earthy, disease of the arterial coats; ought to be considered as an useless, or rather hurtful plan. In cases of a completely opposite description, bandages have produced, and may produce, radical cures of aneurism, and should not be entirely disused.

Guattani first employed compression systematically for the cure of aneurisms, and he has related many cases, in which he succeeded. Freer details other ones; but, in general, pressure has hitherto been applied to the tumour itself, a method less likely to answer, than that of making pressure on a sound part of the artery. Mr. Freer recommends the employment of Sennfio's instrument, or the following method: first place a bandage moderately tight, from one extremity of the limb to the other; then place a pad upon the artery, a few inches above the tumour; next, surrounding the limb with a tourniquet, let the screw be fixed upon the pad, having previously secured the whole limb from the action of the instrument, by a piece of board wider than the limb itself, by which means the artery only will be compressed, when the screw is tightened. The tourniquet should now be twisted till the pulsation in the tumour ceases. In a few hours the limb will become œdematous and swelled, when the tourniquet may be removed, and the pressure of a pad and roller will afterwards be enough. By experiments which this gentleman made on the radial arteries of horses, these vessels were found to become inflamed, and to be rendered impervious by such a process.—(*Freer, p.* 112.)

Mr. A. Cooper mentions an excellent machine for compressing the femoral artery, in cases of popliteal aneurism. It was used by Sir W. Blizard.

"The points of support for this instrument were the outer part of the knee, and the great trochanter, a piece of steel passing from one to the other; and to the middle of this a semicircular piece of iron was fixed, which projected over the femoral artery, having a pad at its end, moved by a screw, by turning which, the artery was readily compressed, and the pulsation in the aneurism stopped, without any interruption to the circulation in the smaller vessels." But, although the patient on whom it was tried possessed unusual fortitude of mind, and indifference to pain, he was incapable of supporting the pressure of the instrument longer than nine hours. Indeed, the agony arising from long continued pressure is insupportable to almost all men. (*Med. and Phys. Journal, Vol.* 8.)

The grand means most to be depended upon, however, for curing aneurisms, is tying the artery above the tumour. This more certainly prevents the usual ingress of blood into the sac, and, what is more important, more certainly excites the adhesive inflammation, by dividing the internal coats of the vessel. The blood in the sac is afterwards gradually absorbed, and the tumour dwindles away in proportion. The natural course of the blood being now permanently interrupted in the arterial trunk, it passes more copiously into the collateral branches, and these enlarging and anastomosing with others, which originate from the large arteries beyond the obstruction, the necessary circulation is carried on.

The ligature of the superficial femoral artery, may be performed with the same confidence of success, as the ligature of the brachial artery, that is, without any fear of destroying the circulation, or depriving the subjacent limb of its vitality. Indeed, the numerous and conspicuous anastomoses, which are met with all round the knee, correspond exactly with those which are observed round the elbow, and at the bend of the arm. This is not a peculiarity of the arteries of the extremities, but it is a general rule which nature has followed in the distribution of all the arteries, that the superior trunks communicate with the inferior, by means of the lateral vessels. After the principal trunk of an artery is tied, its lateral branches not only carry on the circulation in the parts below the ligature, but do so with greater quickness and activity than they did before, when the course of the blood was unimpeded through the principal trunk. This evidently arises from the increase of pressure which the blood, that takes the rout of the lateral vessels, receives, as well as from the enlargement in the diameter of these vessels. After the amputation of the thigh,

while the blood flows in a full stream from the superficial femoral artery, very little or no blood is poured out of the lateral vessels; but as soon as that artery is tied, the blood issues with impetuosity from the small arteries which run along, within the vasti and cruræus muscles; and, on these smaller arteries being also tied, the blood immediately oozes out, from the minute arterial vessels of the muscles and cellular membrane. When the principal trunk of an artery is tied, its lateral branches gradually acquire a much larger diameter. After amputation of the thigh, on account of a popliteal aneurism, the size and situation of which could not fail materially to impede the course of the blood through the trunk of the femoral artery, it has been often remarked, that, although both the trunk and the greater and smaller branches, had been tied with the greatest accuracy, the patients have been in danger of losing their lives, on account of the repeated copious hemorrhages from the innumerable small lateral vessels, that had become unusually enlarged. In several cases, during the treatment, and especially after the radical cure of popliteal aneurism, by tying the superficial femoral artery, in the upper third of the thigh, all the ramifications of the recurrent popliteal arteries have been felt beating strongly round the knee. Boyer found, in a man, who some years before had been operated on for a popliteal aneurism, but had afterwards died from a caries of the tibia, that the arterial branch, which runs through the substance of the sciatic nerve, was dilated so much, as to be equal in diameter to the radial artery. White, in dissecting the arm of a lady, who, fifteen years before had been operated on for an aneurism in the bend of the arm, found the brachial artery obliterated, and converted into a solid cylinder, for three inches below the place of the ligature, and as far as the division into the radial and ulna arteries; but, the recurrent radial and ulnar branches had become so much enlarged that, taken together, they exceeded the size of the brachial artery, above the situation of the ligature. In the dead body it is found, that an anatomical injection will pass more freely from one extremity to the other of an anisreumatic, than of a sound limb, and this, even when no vessels are visibly enlarged. Although it be self-evident, that the circulation through the collateral vessels ought to be much more easy and quick the lower down the ligature is applied to the principal trunk; yet, experience shews, that this difference is not to be estimated very high; for in cases of popliteal aneurism, *cæteris paribus*, the success is the same, whether the femoral artery be tied very low down, or very high up in the thigh. (*Scarpa.*)

This facility of the passage of the blood through the lateral vessels, is not the same in subjects of all ages; and, in the same subject; it is not the same in the inferior, as in the superior extremity. An age under forty-five, and the operation being done on the arm, which is nearer the source of the circulation, than the lower extremity, increases the chance of success.

The circumstances chiefly preventive of success, especially in the popliteal and femoral aneurisms, are the following: Rigidity, atony, or disorganization of the principal anastomoses, between the superior and inferior arteries of the ham and leg; sometimes depending on advanced age, or on it, together with the large size of the aneurism, which, by long continued pressure, has caused a great change in the neighbouring parts: or sometimes on steatomatous, ulcerated, earthy, cartilaginous, disorganization of the proper coats of the artery, not confined to the seat of the rupture, but extending a great way above and below the aneurism, and also to the principal popliteal recurrent arteries, tibial arteries, and occasionally, to portions of the whole track of the superficial femoral artery. Sometimes, the pressure of large aneurisms, renders the thigh bone carious. In such circumstances the ligature is apt to fail in closing the trunk of the artery; and, if it should succeed, the state of the anastomosing vessels will not admit of a sufficient quantity of blood being conveyed into the lower part of the limb. Hence, when the patient is much advanced in life, languid and sickly, when the internal coat of the artery is rigid, and incapable of being united by a ligature; when the aneurism is of long standing, and considerable size, with caries of the os femoris, or tibia; when the leg is weak and cold, much swelled, heavy, and œdematous; Scarpa considers the operation contra-indicated. I must, however, declare in this place, that I have seen very large aneurisms, as well as aneurisms in persons of advanced age, cured by the Hunterian plan, in St. Bartholomew's Hospital.

It appears, then, that the obliteration of the artery, for a certain extent, above and below the place of rupture, forms the primary indication in the radical cure of aneurism, whether compression or the ligature, be employed. All other means are only auxiliary. Internal remedies may be useful in so far as they tend to moderate the determination of the blood towards the place, where the artery has been tied or compressed. Bleeding in

young, very robust, plethoric patients, low diet, diluent drinks, gentle laxatives and glysters, mental and bodily rest, and cool air, have such effect. When there is weakness, not from age, but from pain, long want of rest, or loss of blood, tonics, cordials, and a moderate diet, may be given. Scarpa also advises the outward use of corroborants and stimulants; but, I think, few English surgeons will approve the practice.

Notwithstanding, however, aneurisms cannot in general be cured, as Scarpa has explained, unless the artery be rendered impervious for some extent above and below the tumour, I believe, we must make an exception to this observation, with respect to the few aneurisms of the aorta, (especially those of its arch), which, according to the records of surgery, have been diminished and cured by Valsalva's treatment. In such examples, we are not to suppose, that the aorta becomes obliterated at its very beginning; but, that the diminution of the quantity of circulating blood, the reduced impetus of this fluid, the lessened distention of the aneurismal sac, the general weakness induced in the constitution, and the increased activity of the lymphatic system, all necessary effects of Valsalva's method, have combined to bring about a partial subsidence of the tumour.

In internal aneurisms, and other cases, out of the reach of operative surgery, practitioners have usually been content with prescribing occasional bleedings, debilitating remedies, abstinence, a milk diet, and quietude, &c. As bleeding, however, cannot always be frequently repeated, instead of it, Scarpa says, the hands and feet may be immersed in tepid water, the limb rubbed, and water given internally, with a small quantity of Hoffman's liquor anodynus mineralis. (*Spir. Ætheris. Comp.*) The great difficulty of breathing, adds the same writer, may receive a temporary relief, by applying sinapisms. All pressure on the tumour, when it protrudes externally, should be avoided, as it might increase the compression on the viscera, and would certainly accelerate the fatal bursting of the aneurism.

Digitalis has been given with advantage; but, occasional bleedings, and opium, have been found to produce most relief. In the latter stage, opium can alone be relied on. (*Freer.*)

It must be acknowledged, that practitioners have too commonly abandoned, such aneurisms as do not admit of an operation, as inevitably fatal, and, whatever measures have been taken, in cases of this kind, have rather been pursued with a view of palliating the patient's sufferings, than with any hope of effecting a cure. Yet, we shall find, in the ensuing section of this article, that some exceedingly large aneurisms of the aorta itself, have been cured by copious and repeated, venesections, and the rigorous adoption of Valsalva's practice. Were the same treatment more generally followed, no doubt, internal aneurisms might seem much more curable than they have usually been regarded.

The celebrated Desault conceived, that, when an aneurism was so situated, that a ligature could not be applied to the artery leading to the swelling, a cure might possibly arise from tying the vessel, on that side of the tumour, which was most remote from the heart. Desault conjectured, that, by this means, the circulation through the sac would be stopped, the blood in it would coagulate, that the circulation would go on by the collateral arteries, and that the tumour would be finally absorbed. These speculations, however, were not found to answer in practice. Dechamps tied the femoral artery below an inguinal aneurism; but the progress of the disease, instead of being checked, seemed to be accelerated by this novel experiment. The operator was obliged, as a last resource to open the tumour, and try to take up the vessel. In this attempt, the patient lost a large quantity of blood, and died eight hours afterwards. (See *Œuvres Chir. de Desault par Bichat, Tom. 2, p. 568.*)

OF ANEURISMS OF THE AORTA, AND VALSALVA'S TREATMENT.

This afflicting and fatal disease is by no means unfrequent, and the arch of the aorta is the most common situation of the tumour. Dr. Hunter was of opinion, that the latter circumstance depended on the forcible manner, in which the blood, propelled from the left ventricle of the heart, must be driven against the angle of the curvature of the vessel. The same distinguished physician also thought, that the aneurismal sac was composed of the dilated coats of the artery, which parts nature thickened and studded with ossifications, after the origin of the disease, for the purpose of resisting its increase. The writings of Scarpa, however, make it appear highly probable, that, the generality of aneurisms of the aorta are the consequence of a rupture of the proper coats of this large vessel; and that the cellular sheath of the artery is what becomes distended into the thickened and ossified aneurismal sac. It seems also a fact, that, when the coats of the aorta give way in a certain situation (viz. within the pericardium) where they only receive a very slight external membranous covering, this last part is also apt to be

ruptured at the same time, so as to bring on a copious effusion of blood in the chest, and sudden death.

If these things be true, (and, they appear to be confirmed by most careful and accurate dissections) the common distinction of aneurisms into *true* and *false*, or into aneurisms by *dilatation* and *rupture*, can no longer be regarded as accurate, as we have already explained. Therefore, the idea of Dr. Hunter, that aneurisms of the aorta were swellings of this vessel itself was a mere supposition, and the aneurismal sac, in these, as in all other cases, is composed of the sheath of cellular substance, which surrounds the artery.

We have stated, that Dr. Hunter considered the ossifications of the sac as consequences of the disease; but the celebrated Haller looked upon such scales of bone in the aorta as the very cause of the affection, by rendering the artery inelastic, and incapable of yielding to each pulsation of the heart.

It is very certain, that aneurisms of the aorta are most commonly met with in persons, who are advanced in life, and, it is equally well known, that the aorta of every old subject, whether affected with aneurism, or not, is almost always marked in some place, or another, with ossifications, or, rather, with calcareous concretions. Such productions appear to occasion a decay, or absorption, of the muscular and inner coats of the vessel, so that, at length, the force of the blood makes the artery give way, and this fluid, collecting on the outside of the laceration, or rupture, gradually distends the external sheath of the artery into the aneurismal sac, which itself becomes at least of considerable thickness and studded with ossified specks.

"If any person, who is not prejudiced in favour of the common doctrine, with regard to the nature and proximate cause of this disease (says Scarpa), will examine, not hastily and superficially, but, with care and by dissection, the intimate structure and texture of the aneurism of the aorta, unfolding with particular attention the proper and common coats of this artery, and, in succession, those, which constitute the aneurismal sac, in order to ascertain distinctly the texture and limits of both, he will clearly see, that the aorta, properly speaking, contributes nothing to the formation of the aneurismal sac, and, that, consequently, the sac is merely the cellular membrane, which, in the sound state, covered the artery, or that soft cellular sheath, which the artery received in common with the neighbouring parts. This cellular substance, being raised and compressed by the blood, effused from the corroded or lacerated artery, assumes the form of a circumscribed tumour, covered externally, in common with the artery, by a smooth membrane, such as the pleura in the thorax, and the peritoneum in the abdomen.

"I do not pretend to deny, (continues this accurate anatomist), that, sometimes, in consequence of congenital relaxation of the proper coats of the aorta, at its exit from the heart, a certain degree of yielding of these coats may contribute to the rupture of the aorta at this place, and, by that means, to the formation of an aneurism, which, in this case, is likewise conjoined with a certain degree of preternatural dilatation of the whole tube of the artery. I only deny, that dilatation of this artery precedes and accompanies every aneurism of the aorta, and am unwilling to admit, that, in the formation of this formidable disease, the proper coats of the aorta ever yield so much to distention, as to form the aneurismal sac. With regard to this point, it is a fact worthy of the attention of medical men, and of all those, who wish to investigate this subject, that the root of an aneurism of the aorta, in whatever point of this artery it appears, never includes the whole circumference of the tube of the artery; but, that the root constantly occupies and involves only the one, or the other side of the artery, from which side, the aneurismal sac rises and enlarges, in the form of an appendix, or tuberosity, more or less large and extended, according to the circumstances of the place, or of the period of the disease; while, on the contrary, the dilatation of the artery occurs constantly in the whole circumference of the tube, and therefore differs essentially from aneurism." (*Scarpa on the Anatomy, Pathology, and Surgical Treatment of Aneurism, Transl. by Wishart, p. 55, 56.*)

In whatever manner aneurisms of the aorta are formed, there are no diseases, which are more justly dreaded, or which more completely fill the surgeon, as well as the patient, with despair. No affliction, indeed, can be more truly deplorable; for, the sufferings, which are occasioned, hardly ever admit even of palliation, and the instances of recovery are so very few, that no consolitary expectation can be indulged of avoiding the fatal end, to which the disease naturally brings the miserable sufferer.

The existence of aneurisms of the aorta, is scarcely ever known with certainty, before they have advanced so far, as to be attended with an external pulsation, and a tumor, that admits of being felt, or even seen. In very thin subjects, the throbbing of the abdominal aorta is sometimes unusually plain through the integuments and viscera, and this has occasionally given rise to the suspicion of an aneu-

rism; a circumstance, which deserves to be remembered by every surgeon, desirous of not pronouncing a wrong opinion. While thoracic aneurisms of the aorta are accompanied with no degree of external swelling, the symptoms are all equivocal, and might depend on a disease of the heart, angina pectoris, and several other affections. Violent and irregular throbbings frequently occur between the fourth and fifth true ribs of the left side; the same irregularity of the pulse prevails as often proceeds from organic affections of the heart; the respiration is exceedingly obstructed; the voice altered; and, in a more advanced period of the malady, the patient is at times almost suffocated. The pressure of the internal swelling on the trachea, bronchia, and lungs is sufficient to account for this difficulty of breathing. In many instances, the irritation and compression, produced by the tumor, occasion an absorption of the greater part of the lungs, and abscesses and tubercles throughout the portion, which remains. Even the function of deglutition suffers interruption, in consequence of the pressure made on the œsophagus, which may even be in a state of ulceration. Thus, in an example recently published, we read, that "the cavity of the windpipe was nearly obliterated from the pressure of the aneurism; and the extremities of four of its cartilages lay in the œsophagus, having entered that canal, through an ulcer in its coats." (*Transactions of a Society for the Improvement of Med. and Chirurgical Knowledge, Vol.* 3, *p.* 83.) The way, in which aneurisms of the thoracic aorta prove fatal, is subject to considerable variety. These swellings do not always destroy the patient by hemorrhage; in numerous instances, the magnitude of the disease so impedes respiration, that death seems induced by suffocation, and not a drop of blood is found internally effused. Frequently, (to use the description of Mr. John Bell) before the awful and fatal hemorrhage has had time to occur, the patient perishes of sufferings too great for nature to bear. The aneurismal tumour so fills the chest, so oppresses the lungs, compresses the trachea, and curbs the course of the descending blood, that the system, with a poor circulation of ill-oxydated blood, is quite exhausted. And, thus, though the patient is saved from the most terrible scene of all, he suffers great miseries; he experiences in his chest severe pains, which he compares with the stabbing of knives; terrible palpitations; an awful sense of sinking within him; a sound within his breast, as if of the rushing of waters; a continual sense of his condition; sudden startings during the night; fearful dreams and dangers of suffocation, until, with sleepless nights, miserable thoughts by day, and the gradual decline of an ill-supported system, he grows weak, dropsical, and expires. (See *Anatomy of the Human Body, by John Bell, Vol.* 2, *Edit.* 3, *p.* 234, 235.)

The situations, in which aneurisms of the curvature of the aorta burst, are different in different cases. Sometimes the swelling bursts into the cavity of the chest, or that of the pericardium, and the patient drops suddenly down. In other examples, the blood is effused into the trachea, or bronchia, and the patient, after violent coughings and ejections of blood from the mouth, expires. In certain cases, the swelling beats its way through the ribs, destroys the vertebræ, and injures the spinal marrow, so that the patient suffers a species of death, somewhat less violent and sudden. But, although aneurisms in the chest do sometimes present at the back, a circumstance, that depends on the particular situation of the disease, (see *Pelletan's Clinique Chirurgicale, Tom.* 1, *Obs.* 7, *p.* 84.), they more commonly rise towards the upper part of the breast, where a throbbing tumour occurs, which has caused an absorption of the opposing parts of the ribs and sternum; and sometimes dislocated the clavicles. The swelling now pulsates in an alarming way. The blood is only retained by a thin covering of livid skin, which is becoming thinner and thinner. At length, a point of the tumour puts on a more conical, thin, and inflamed appearance than the rest; a slough is formed, and, on this becoming loose, the patient is instantaneously carried off by a sudden gush of blood.

A singular case of aneurism of the aorta is related by Dr. C. W. Wells. The disease, being unattended with any external swelling, it seems, was not known with certainty during the patient's lifetime.

The following is an abstract of the symptoms, and particulars of the case. Mr. A. B. a gentleman, thirty-five years of age, and temperate in his habits, became affected in 1789 with symptoms, which were thought to denote the approach of pulmonary consumption. These, however, after some time, entirely disappeared. In 1798, he was attacked with a slight hemiplegia, from which he also recovered, with the exception of an inconsiderable sense of coldness in the foot, which had been paralytic. In March 1804, he complained of being frequently troubled with a noise in his ears, flatulence in his bowels, and pains in his hands and feet, sometimes attended with slight swellings in the same parts. From one, or more of these symptoms, he was never afterwards quite free; but, he did not complain of any unusual feelings in

his chest. August 11, 1807, he fatigued himself considerably with walking; ate rather a hearty dinner; and, having refreshed himself with some sleep afterwards, he played about with his children. While thus amusing himself, he was suddenly seized, between eight and nine o'clock, with great oppression in his chest. He soon afterwards became sick, and, in the matter thrown up, some streaks of blood were observed. He now went to bed; but, though the weather was warm, and he was covered with bedclothes, his skin felt cold to the attendants. At midnight, he laboured under a constant cough, and expectorated mucus tinged with blood. His body was moistened with a cold sweat, and his pulse was extremely feeble; sometimes, it was scarcely perceptible. About five in the morning, his pulse was feeble and irregular; his breathing difficult, his skin pale, cold, and covered with a clammy sweat. He frequently tossed, and writhed his body, as if he was suffering great pain or uneasiness. The mental faculties, however, seemed unimpaired. Shortly, afterwards, he expired, having complained, just before his death, of much heat in his chest, and thrown off the bed-clothes.

The most remarkable circumstance found on opening the body, is thus recorded: "The ascending aorta was distended to about the size of a large orange. The tumour adhered to the pulmonary artery, just before its division into the right and left branches. Within the circumference of this adhesion, there was a narrow hole, by means of which a communication was formed between the two arteries."

Dr. Wells concludes with observing, that, though such a disease might easily have been imagined, he has found no instance of it in books, and that it has not been observed by any of the surgeons, or anatomists in London. He supposes, that the communication, between the aorta and pulmonary artery, took place on the evening before the patient's death, when the oppression in the chest was first felt; and that, in consequence of the superior strength of the left side of the heart, a part of the blood, which was thrown into the aorta, must have been forced into the pulmonary artery, from which circumstance, he conjectures most of the symptoms originated. (*Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge, Vol.* 3, *p.* 85.)

The bursting of an aneurism of the aorta into the pulmonary artery is then another possible mode, in which the disease may prove fatal.

It is well worthy of notice, that aneurisms of the arch of the aorta may occasion a tumour, so much like that of a subclavian aneurism, as to be in danger of being mistaken for the latter disease. An example of this kind is related by Mr. Allan Burns, "a case," says he, "on which several of the most distinguished practitioners in Edinburgh, and almost every surgeon in Glasgow were consulted. The nature of the disease appeared to be so decided, and its situation in the subclavian artery so clear, that, on that subject, there was no difference of opinion. Some were, however, of opinion, that an operation might be performed, while others were fully convinced, that the case was hopeless. For myself, I must confess, that I was firmly persuaded, that, in the early stage of the disease, an operation might have been beneficial," &c. (*Surgical Anatomy of the Head and Neck, p.* 30.) After death, the vessel, which was supposed to have been most materially affected, was found perfectly healthy.—(*P.* 39.)

After detailing all the particulars of this interesting case, Mr. A. Burns observes, that, "it corroborates Mr. Astley Cooper's remark, that aneurism of the aorta may assume the appearance of being seated in one of the arteries of the neck; an inference, drawn from the examination of a case, which came under his own observation, and of which he had the goodness to transmit a short history to me, along with a sketch, illustrative of the position of the tumour. In one case, the aneurism was attached to the right side of the aortic arch, and involved a part of the arteria innominata; in Mr. Cooper's, the tumour arose from the left side of the arch, from between the roots of the left subclavian, and carotid arteries. It formed a florence-flask-like cyst, the bulbous end of which projected at the root of the neck, from behind the sternum, and so nearly resembled aneurism of the root of the carotid artery, that the practitioner, who consulted Mr. Cooper, actually mistook the disease for carotid aneurism." (*Allan Burns, Op. cit. p.* 41.)

As we have already noticed, aneurisms of the aorta are most frequent at its curvature; but, they are also met with on the other portion of this vessel in the thorax, and likewise on that part of it, which is below the diaphragm. In subjects, predisposed to aneurisms, such swellings are frequently seen affecting various parts of the aorta at the same time.

When the disease occurs in the abdominal aorta, a preternatural pulsation generally becomes perceptible at some point of the parietes of this part of the body. The pressure of the tumour interferes with the functions of the viscera; the breathing is rendered difficult by the swelling resisting the descent of the diaphragm; the patient suffers at times ex-

cruciating internal pains; sometimes he is affected with costiveness; sometimes, with diarrhæa; and, not unfrequently, with incontinence of the urine and feces. At length, an immense external swelling is formed, which pulsates alarmingly, and, if the patient survives long enough, destroys him by a sudden external, or internal effusion of blood.

Aneurisms, within the thorax and abdomen, being entirely out of the reach of operative surgery, have been too commonly abandoned as unavoidably fatal, and when any thing has been done in such cases, it has generally been only with a view of palliation. Moderating the force of the circulation by bleedings and low diet, avoiding every thing that has the least tendency to heat the body, or quicken the motion of the blood, keeping the bowels well open with laxative medicines, and lessening pain with opiates, have been the means usually employed. Of late years, also, the digitalis, which has a peculiar power of diminishing the action of sanguiferous system and impetus of the blood, has been prescribed, with every appearance of benefit.

It was the opinion of the celebrated Valsalva, that the utility of a lowering plan of treatment might do more, than merely retard the death of aneurismal patients. It was his belief, that the method might entirely cure such aneurisms as had not already made too much progress, and he put it into practice with such rigour and perseverance, that the treatment became considered as particularly his own. The plan, alluded to, is not described in his writings; but, was published in the first volume of the Commentaries of the Academy of Bologna, by Albertini, one of his fellow students; and several persons, who had learnt this method of Valsalva, afterwards imparted it to others. Thus, as Morgagni was passing through Bologna, in 1728, Stancazi, a physician of that place, is said to have informed him of Valsalva's practice.

After taking away a good deal of blood by venesection, Valsalva used next to diminish the quantity of food gradually, till the patient at length was allowed only half a pint of soup in the morning, a quarter of a pint in the evening, and a very small quantity of water, medicated with mucilage of quinces, or with the lapis osteocolla. When the patient had been so reduced, as to be incapable of getting out of his bed, Valsalva used to give him more nourishment till this extreme dibility was removed. Valsalva was sure, that some aneurisms, thus treated, had got well, because every symptom disappeared, and his conviction was verified by an opportunity, which he had of dissecting the body of a person that had been cured of this disease, and afterwards died of another affection; for, the artery, which had been dilated, was found contracted and in some degree callous.

Morgagni relates, that this method of treating aneurisms, is somewhat like the plan, which Bernard Gengha tried with success, as well as Lancisi, and he refers us to the 24th chapter of the 2nd vol. of the Anatomy of the one, and to lib. 2, cap. 4, of the Treatise on the Heart and Aneurisms, of the other. But, Sabatier tells us, that, in consequence of this instruction, he examined both these works, without finding any thing on the subject. However this may be, we are informed by the latter, that he has seen the good effects of the practice in an officer, who had an alarming aneurism in front of the humeral extremity of the clavicle, in consequence of a sword wound in the axilla. The patient, after having been bled several times, was confined to his bed, and kept to an extremely low diet. He was allowed, as drink, only a very acid kind of lemonade. He took pills containing alum, and the swelling was covered with a bag, full of tan mill dust, which was every now and then well wet with port wine. By a perseverance in this treatment, the swelling was reduced to a smallish hard tubercle, having no pulsation, and a perfect cure ensued. (See *Sabatier's Médecine Opératoire, Tom.* 3, *p.* 170—172.)

A French surgeon, named Guérin, has written in favour of the efficacy of applying ice water, or pounded ice to aneurismal swellings; a plan, which he represents, as being often of itself sufficient to effect a cure. This topical employment of cold applications may be rationally and conveniently adopted in conjunction with Valsalva's practice.

The most interesting and convincing facts, in proof of the efficacy of this mode of treatment, have been lately published at Paris by M. Pelletan. Indeed, upon the whole, I have no hesitation in saying, that I have never read any modern collection of surgical cases, which have appeared to me more valuable, than those which compose the Clinique Chirurgicale of this experienced writer. The following extract from a well written critique on this work will serve to convey to the reader some idea of the important information contained in the memoir on internal aneurisms. "The intent in the treatment is to reduce the patient gradually to as extreme a degree of weakness, as is possible, without imminently endangering life. It is done by absolute rest, a rigorous diet, and bleeding; to these means, M. Pelletan adds the external application of ice, or cold and astringent washes, &c. He has here detailed many cases from his own practice, of partial, or complete

success, which cannot be too generally known, as they may be the means of creating in some, and of confirming in others, a good opinion of the only method of treatment, which has been found at all efficacious in a dreadful and not unfrequent organic disease.

"Of the cases here recorded, some appear to have been cured; in others, the treatment had marked good effects. In extreme cases, at best, it afforded but partial and temporary relief. We can notice but a few of these cases, which are, in every respect, highly interesting. In one, a robust man, an aneurism at the root of the aorta, with a pulsating tumour of the size of an egg, projecting between the ribs, (the edges of which were already partly absorbed) was reduced, so as to recede within the ribs in the course of eight days. At the end of this time, the patient refused to submit any longer. The tumour did not appear again for nearly a year, although he returned to very drunken and irregular habits. He died in about two years and a half, with the tumour again appearing, and much increased in volume. The aneurismal sac communicated with the aorta by a smooth and round opening, opposite to one of the sigmoid valves. There can be no doubt of the efficacy of the treatment in this case; and it is highly probable, that his health and his life might have been long preserved, but for his own indiscretion. In a case somewhat similar, but not so far advanced, the patient appears to have been cured. There was a swelling on the right side of the breast, about six inches in circumference, with a very strong beating. The pulsation was accompanied by a pain, which stretched towards the scapula and the occiput. It was evident, that the disease was an aneurism of the great arch of the aorta. The patient was a crier, of a strong frame, who was accustomed to drink freely. In the four first days, he was bled eight times, drawing three dishes, "palettes" in the morning, and two in the evening. On the fifth, the pains and the beating were much lessened, but the pulse was still full. He was again bled once. The pulse was in a favourable state, as to strength till the seventh day, when it again rose, and the man was twice bled.

During this time, the man was kept to a most rigorous diet. A cold poultice of linseed and vinegar was placed on the tumour, and renewed when it became warm. At the end of eight days, the good effects of this plan were very evident, the pain and the pulsation were gone. The patient, though weak, was in health and tranquil. He was now allowed more food by degrees. At the end of four weeks from the commencement of the treatment, he left the Hôtel Dieu well. He afterwards led a sober life, became fatter than before, without any vestige of disease, except a slight and deep pulsation at the part, in which the aorta may always be felt beating in its natural state. He died, two or three years after, of another complaint. His death was not known, and the body was not examined." (See *London Med. Review, Vol. 5, p.* 123.)

M. Pelletan also cured by similar treatment a large axillary aneurism, which was regarded as beyond the reach of operative surgery. On the thirteenth day, the patient was reduced to a degree of weakness, which alarmed many of the observers. From that time, all pulsation in the tumour ceased. The contents were gradually absorbed; and the patient returned to his former laborious life with his arm as strong as ever. The pulse at the wrist was lost, in consequence of the obliteration of the axillary artery, and the limb only receiving blood through the branches of the subclavian artery. *Il y a beaucoup d'exemples d'aneurismes guéris spontanément et sans le secours de l'art;* (says Pelletan) *mais on ne peut leur comparer le cas que nous venons de décrire; l'état extrême de la maladie, l'energie des moyens employés, et l'effet immédiat et successif qui en est résulté, prouvent assez que le succès a été dû tout entier à l'art.*" (*Clinique Chirurgicale, Tom.* 1, *p.* 80.)

In this work, we find not less than three cases, in which aneurism of the aorta is stated to have been effectually cured. One instance was greatly relieved; but, the disease returned, the next year, in consequence of the patient's intemperate mode of life. In another example, an aneurism at the origin of the aorta was cured; but, the disease recurred in another part of that vessel further from the heart. Even such cases, as proved incurable, to the number of fourteen, all received various degrees of palliation from the treatment adopted.

I shall now proceed more particularly to the consideration of aneurisms, which may be cured by a surgical operation, and, here, we shall be fully satisfied, that "*l' art de guérir ne triomphe jamais plus heureusement que lorsqu'il peut employer la médecine efficace, c'est à dire, les moyens chirurgicaux ou opératoires.*" (*Clinique Chirurgicale, Tom.* 1, *p.* 110.)

OF THE POPLITEAL ANEURISM, AND OPERATION FOR ITS CURE.

The practice of tying arteries, wounded either by accident or in the performance of surgical operations, and even the plan of tying the humeral artery for the cure of the aneurism at the bend of the arm, were known long before the operation for the relief of the popliteal aneurism was

attempted. The considerable size of the femoral artery; its deep situation, the urgent symptoms of the disease, and ignorance of the resources of nature for transmitting blood into the limb, after the ligature of the vessel, are the circumstances, which appear to Pelletan to have deterred former surgeons from this operation. Valsalva, indeed, had treated popliteal aneurisms on the debilitating method, and has adduced one or two equivocal proofs of its success.

In Pelletan's first memoir on aneurism, and in the third vol. of Sabatier's Médecine Opératoire, as I have already stated, are two cases of axillary aneurisms, which were cured by Valsalva's treatment. But, encouraging as such examples may be, experience is not yet sufficiently favourable to this practice to allow it to bear a comparison, in point of efficacy, with the surgical operation, or to justify the general rejection of this last more certain means of cure. As Pelletan admits, Valsalva's treatment is extremely severe; the event of it is doubtful; and, should it not be found to answer, it is questionable, whether the patient would be left in a condition to bear the operation, for the success of which, it seems necessary, that, a certain strength of vascular action should exist in order that the blood may be freely transmitted through such arterial branches, as are to supply the place of the main trunk, after this last has been tied.

The time, therefore, has not yet arrived, when surgical operations for the relief of aneurisms should be relinquished. (*Pelletan, Clinique Chirurgicale, Tom.* 1, *p.* 114, 115.)

The cure of popliteal aneurisms by means of compression is occasionally effected; but, it happens too seldom to claim a great deal of confidence, or to lessen in any material degree the utility and importance of operative surgery in this part of practice. Pelletan records the cure of one popliteal aneurism by compression and absolute repose, during eleven months (*Tom.* 1, *p.* 115), and other examples might be cited, were it necessary.

Aneurisms in general, and, among them, the popliteal case, are all attended with some little chance of a spontaneous cure; yet, this desirable event is too uncommon to be a judicious reason for postponing the operation, especially, as it is the usual course of the disease to continue to increase, the cure in the early stage may be more speedily accomplished, and the experience of modern operators leaves no room for apprehending that the anastomoses will not suffice for the due nourishment of the leg, and, consequently, proves, that waiting for the enlargement of the collateral vessels to take place, is altogether an unnecessary and ineligible method. Popliteal aneurisms, as well as other external tumours of the same nature, stand the best chance of a spontaneous cure, when any cause induces a general, violent, and deep inflammation all over the swelling; for, then, the communication, between the sac and artery, may possibly become closed with coagulating lymph, and the pulsation of the tumour be suddenly and permanently stopped. If, in this state, the disease sloughs, and the patient's constitution holds out, the coagulated blood in the sac and the sloughs, are gradually detached, leaving a deep ulcer, which ultimately heals. An example, in which a popliteal aneurism seems to have been cured by such a process, is related in the *Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge, Vol.* 2, *p.* 268.

After what has been stated, it is almost unnecessary to say, that, in former times, when all hopes of curing a popliteal aneurism by Valsalva's method, by compression, or a natural process, were at an end, amputation of the limb was considered as the sole and necessary means of saving the patient's life. In modern times, a great and beneficial change of opinion has taken place upon this subject, and not only may the patient's life be in general saved, but his limb also, and this without any operation, that can be compared with amputation, in regard to severity.

It is alledged, that Teislere, Molinelli, Guattani, Mazotti, and some other celebrated Italian surgeons, were the first, who ventured to tie the popliteal artery for the cure of aneurism. The path, as Pelletan remarks, had been pointed out to them by Winslow and Haller, whose valuable descriptions and plates of the arterial anastomoses about the knee joint, shewed by what means the lower part of the limb would be nourished, after a ligature was made on the principal arterial trunk. For almost thirty years, however, the practice of tying the popliteal artery was confined to the Italian surgeons. Pelletan believes, that he was the first, who attempted such an operation at Paris nearly thirty years ago, (alluding to about the year 1780, the Clinique Chirurgicale being dated 1810.)

However, this operation of opening the tumour and tying the popliteal artery itself, was a severe and often a fatal proceeding, and does not admit of being compared with the Hunterian operation, in point either of simplicity, safety, or success, as I shall explain, after a few particulars relating to the popliteal aneurism have been detailed.

On whatever side of the artery the tumour is produced, it can be plainly felt in the hollow between the hamstrings, and its nature is as easily ascertained by

the pulsation in every part of the tumour. Though the disease may, perhaps, not occur in the popliteal artery so often as in the aorta itself, yet, it certainly is seen more frequently in the former vessel, than any other branch, which the aorta sends off. As Mr. Home has observed, this circumstance has never been satisfactorily explained, and, what is rather curious, in many recent instances of this disease, the patients have been coachmen and postillions. Morgagni found aneurisms of the aorta most frequent in guides, post-boys, and other persons, who sit almost continually on horseback. This he imputes to the concussion and agitation, to which they are exposed.

When we contemplate the effects of various postures of the leg and thigh on the popliteal artery, and the obstruction, which the circulation in it must experience, when the knee is in a state of flexion, we perceive an assignable cause, why this artery should be so often diseased. This account is, in some degree, strengthened by aneurisms of the aorta itself, occurring more frequently at its curvature, than any other part. (*Home in Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge, Vol.* 1.)

The popliteal aneurism is generally supposed to arise from a weakness in the coats of the artery, independently of disease. If this were true, we might reasonably conclude, that, except at the dilated part, the vessel would be sound. Then the old practice of opening the sac, tying the artery above and below it, and leaving the bag to suppurate and heal up, would naturally present itself. Mr. Hunter finding, that the arterial coats were altered in structure higher up, than the tumour, and that the artery, immediately above the sac, seldom united when tied; but, that, when the ligature came away, the bleeding destroyed the patient; concluded, that some disease affected the coats of the vessel, before the actual occurrence of the aneurism. Dissatisfied with Haller's experiments on frogs, shewing that weakness alone could give rise to aneurism, he tried what would happen in a quadruped, whose vessels were very similar in structure to the human. Having denuded above an inch of the carotid artery of a dog, and removed its external coat, he dissected off the other coats, layer after layer, till what remained was so thin, that the blood could be seen through it. In about three weeks, the dog was killed, when the wound was found closed over the artery, which was neither increased, nor diminished in size.

It being conjectured, that aneurism was, perhaps, prevented, by the parts being immediately laid down on the weakened portion of the artery, Mr. Home stripped off the outer layers of the femoral artery of a dog, placed lint over the exposed part of the vessel to keep it from uniting to the sides of the wound, and, in six weeks, killed the animal, and injected the artery, which was neither enlarged, nor diminished, and its coats had regained their natural thickness and appearance.

These experiments strengthened Mr. Hunter's belief, that aneurismal arteries are diseased; that the morbid affection frequently extends a good way from the sac along the vessels; and that the cause of failure in the old operation, arose from tying a diseased artery, which was incapable of uniting, before the separation of the ligature.

Mr. Hunter's reflections led him to propose taking up the artery in the anterior part of the thigh, at some distance from the diseased portion, so as to diminish the risk of hemorrhage, and be enabled to get at the vessel again, in case it should bleed.

The flux of blood into the sac being stopped, he concluded, the sac and its contents would be absorbed, and the tumour gradually disappear, so as to render any opening of the sac unnecessary.

The first operation of this kind, ever done, was performed on a coachman, by Mr. Hunter, in St. George's Hospital, December, 1785. An incision was made on the anterior and inner part of the thigh, rather below its middle, which wound was continued obliquely across the inner edge of the sartorine muscle, and made large, in order to facilitate doing whatever might be necessary. The fascia, covering the artery, was then laid bare, for about three inches, after which the vessel itself could be plainly felt. A cut, about an inch long, was then made through this fascia, along the side of the artery, and the fascia dissected off. Thus the vessel was exposed. Having disengaged it from its connexions with the knife and a thin spatula, a double ligature was put under it, by means of an eye probe. The doubled ligature was then cut, so as to make two separate ones. The artery was now tied with both these ligatures, but, *so slightly as only to compress the sides together*. Two additional ligatures were similarly applied a little lower, with a view of compressing some length of artery, so as to make amends for the want of tightness, as it was wished to avoid great pressure on any one part of the vessel. The ligatures were left hanging out of the wound, which was closed with sticking plaster. On the second day, the aneurism had lost one-third of its size, and, on the fourth, the wound was every where healed, except where the ligatures were situated. On the ninth, there was

a considerable discharge of blood from the apertures of the ligatures, but it ceased on applying a tourniquet and did not recur. On the fifteenth day, after the operation, some of the ligatures came away, followed by a small quantity of matter, and about the latter end of January, 1786, the man went out of the hospital, the tumour having become still less. In the course of the spring, some abscesses in the vicinity of the cicatrix followed, and some pieces of ligature were discharged, from time to time. In the beginning of July, a piece of ligature, about one inch long came away, after which the swelling went off entirely, and the man left the hospital again on the 8th perfectly well, there being no appearance of swelling in the ham.

This subject died of a fever in March, 1787, and, on dissection, the femoral artery was found impervious from the giving off of the arteria profunda down to the place of the ligature, and an ossification had taken place for an inch and a half along the course of this part of the vessel. Below this portion, the vessel was pervious, till just before it came to the aneurismal sac, where it was again closed. What remained of the sac was somewhat larger than a hen's egg, and it had no remains of the lower opening into the popliteal artery. The rest of the particulars of this dissection are very interesting. (*See Med. and Chir. Trans. Vol.* 1. *p.* 153.)

This celebrated case led to the knowledge, that simply taking off the force of the circulation is sufficient to cure an aneurism, the tumour being then taken away by absorption.

To confirm the fact, Mr. Home relates a case of femoral aneurism, which got well without an operation, but, on the same principle. A trial of pressure had been made, without avail. The tumour became very large, and such inflammation took place in the sac and integuments, that mortification seemed impending. In this state, no pulsation could be felt in the tumour, or the artery above it. A coagulum, which we know always occurs in an artery previously to mortification, seemingly to prevent bleeding, probably formed in this instance, and kept the blood from entering the sac. (*Home.*)

Mr. Hunter's second operation was on a trooper. Instead of using several ligatures, which were found hurtful, he tied the artery and vein with a single strong one; but, unluckily, made the experiment of dressing the wound from the bottom, instead of uniting it at once: the event was, the man lost a good deal of blood, and died.

After this, Mr. Hunter's practice was to tie the artery alone with one strong ligature, and unite the wound as speedily as possible.

Since the time of Hunter, several innovations, and some considerable improvements in the mode of operating have been proposed.

The peculiarity in Mr. Abernethy's first operation consisted in applying two ligatures round the artery, close to where it was surrounded with its natural connexions. For this purpose, he passed two common sized ligatures beneath the femoral vessels, and having shifted one upwards, the other downwards, as far as these vessels were detached, he tied both the ligatures firmly.

The event of this case was successful. An uneasy sensation of tightness, however, extending from the wound down to the knee, and continuing for many days after the operation, made Mr. Abernethy determine, in any future case, to divide the artery between the two ligatures, so as to leave it quite lax.

Mr. Abernethy next relates a case of popliteal aneurism, for which Sir Charles Blicke operated, with the innovation of dividing the artery between the ligatures. The man did not experience the above kind of uneasiness; and no hemorrhage ensued when the ligatures came away, although there was reason to think, that the whole arterial system had a tendency to aneurism, as there was also another tumour of this kind in the opposite thigh.

Mr. Abernethy has referred bleeding, after operations for aneurisms, to two causes; viz. 1st. the inflammation and ulceration of the artery; 2dly. the want of union between the sides of the vessel. When an artery is laid bare, and detached from its natural connexions, and the middle of such detached portion tied with a single ligature, as was Mr. Hunter's practice, it is observed by Mr. Abernethy, that the vessel, so circumstanced, must necessarily inflame, and be very likely to ulcerate. The occurrence of bleeding led to a practice, which this gentleman justly censures, viz. applying a second ligature above the first, and leaving it loose, but ready to be tightened, in case of hemorrhage. As the second ligature, however, must keep a certain portion of the artery separated from the surrounding parts, and must, as an extraneous substance, irritate the inflamed vessels, it must make its ulceration more apt to follow. For the same reason, Mr. Abernethy thinks pieces of wood, cork, &c. hurtful, and when employed with a view of hindering the ligature from cutting completely through the artery, their interposition is not necessary, as such an accident scarcely ever occurs, and, as they would prevent

the ligature from dividing the inner and muscular coat, (see *Hemorrhage*) they would tend to prevent the adhesion of the opposite sides of the vessel to each other.

When the artery is tied in Mr. Abernethy's manner, and is divided in the space between the ligatures, it becomes quite lax, possesses its natural attachments, and is, as nearly as possible, in the same circumstances as the femoral artery is, when tied on the surface of a stump. (See *Surg. and Physiol. Essays by J. Abernethy.*)

Notwithstanding Scarpa has excelled other writers so much, in his description of the anatomy and formation of aneurisms, his practice in regard to the operation, is certainly far inferior to Mr. Abernethy's, and that of practitioners in general in this country. His interposing a cylindrical roll of linen, between the artery and knot of the ligature, and his not bringing the sides of the wound together immediately after the operation, are particularly objectionable parts of his method.

There is one excellence, however, in Scarpa's mode of operating, which I think will soon obtain the universal approbation of the surgical profession; he prefers making the incision in the upper third of the thigh, or a little higher than the place where Mr. Hunter used to make the wound. His reason for this, is to avoid the necessity of removing the sartorius muscle too much from its position, or of turning it back, to bring the artery into view, so as to be tied. I have seen the best operators embarrassed, by having the sartorius muscle immediately in their way after the first incision, and as the vessel is more superficial a little higher up, the place is further from the diseased part of the artery, and there is no hazard of the anastomoses failing to keep up the circulation; this part of Scarpa's practice is highly deserving of imitation.

It will in no manner diminish the merit of those men, who have successfully laboured to improve the present part of the practice of surgery, to state, that the most ancient surgeons seem to have known and practised some of the chief things, upon which the superiority of the plan now adopted appears principally to depend. Such methods having quite sunk into oblivion, and John Hunter not being one who pried into old works, his innovations claim all the honour due to the strictest originality. It is a fact, worthy of notice, that the Greeks were acquainted with the practice, lately recommended, of tying and dividing the trunk of the artery high above the tumour, as will appear from the following extract: (*Ætii. 4 Serm. Tetr. 4. cap. 10.*) *At vero quod in cubiti cavitate fit aneurisma, hoc modo per chirurgiam aggredimur: primum arteria supernè ab ala ad cubitum per internam brachii parte simplicem sectionem, tribus, aut quatuor digitis infra alam, per longitudinem facimus, ubi maxime ad tactum arteria occurrit: atque ea paulatim denudata, deinceps incumbentia corpuscula sensim excoriamus ac separamus, et ipsam arteriam cæco uncino attractam duobus fili vinculis probe adstringimus, mediamque inter duo vincula dissecamus; et sectionem polline thuris explemus, ac linamentis inditis congruas deligationes adhibemus.* Afterwards we are directed to open the aneurismal tumour at the bend of the elbow, and when the blood has been evacuated, to tie the artery twice, and divide it again. If the ancients had only omitted the latter part of their operation, they would absolutely have left nothing to be discovered by the moderns. What a striking example of the bold manner in which our forefathers have acted, without being guided by the lights of anatomy and physiology! But there are two or three passages in Galen, Celsus, and Hippocrates, from which we may suspect, that even Ætius himself was not the inventor of this operation, &c. See also *Paul. Ægin. lib. 6. cap. 37.* (*Rees's Cyclopedia, Art. Aneurism.*)

The French surgeons of the present day are exceedingly jealous about the improvements, which British practitioners have been the means of introducing into this branch of surgery. Pelletan declares, that, with regard to dividing the artery between the ligatures, his countryman M. Tenon, used to advise this practice forty years ago. (*Clinique Chirurgicale, Tom. 1, p. 192.*) Yet we find that M. Tenon himself must give up the claim of priority to Ætius, and other ancients. The merit of the thing appears to me to consist in the revival of the practice, and in insisting on its advantages, with sufficient stress to make it extensively approved.

M. Richerand seems also offended, that Hunter's name should be affixed to an operation, which he conceives was in reality the invention of Guillemeau. Here we observe, Ætius again puts in a prior claim, and, with much more effect, because his operation truly resembled Mr. Hunter's, inasmuch as it was done at some distance above the swelling, while Guillemeau only tied the artery close above the disease, and opened the swelling, a serious deviation from the Hunterian practice.

Guillemeau (says Richerand) a contemporary, and disciple of Ambrose Paré, having to treat a tumour of blood, at the bend of the arm, in consequence of bleed-

ing, exposed the artery above the tumour, tied this vessel, then opened the sac, took out the coagulated blood contained in it, and dressed the wound, which healed by suppuration. After more than a century, Anel, on being consulted about a similar case, tied the artery above the swelling, but left this to itself. The pulsations ceased, the tumour became smaller, and hard, and after some months, no traces of the disease were perceptible.

In 1785, Desault operated in the same manner for a popliteal aneurism: the swelling diminished by one half, and the throbbings ceased; on the 20th day, it burst, coagulated blood and pus were discharged in large quantities, and the wound, after continuing a long time fistulous, at length healed. Towards the end of the same year, says Richerand, Hunter applied the ligature somewhat differently; instead of placing it close to the swelling, or directly above it, he put it on the inferior part of the femoral artery. (See *Richerand's Nosographie Chirurgicale, Tom.* 4, *p.* 98, 99, *edit.* 2.)

Unquestionably, M. Anel did in one solitary instance, tie the humeral artery immediately above an aneurism at the bend of the arm, and effected a cure without opening the swelling; but he did not think of applying the plan to the femoral artery, or draw the attention of the French surgeons sufficiently to the matter, to make the latter imitate his operation: on the contrary, the method fell into oblivion, and was never practised. With regard to Desault's operation, said to have been done in an earlier part of 1785, than Mr. Hunter's first operation, it is only necessary to say, that Desault tied the popliteal artery itself, while the grand object in Mr. Hunter's method was to take up the femoral artery, at a distance from the disease, and that it is this last mode alone, which has gained such approbation, and been attended with unparalleled success.

Mr. Astley Cooper has published a case of popliteal aneurism, in which a particular occurrence happened, that led this gentleman to make a little innovation in the method of tying arteries for the cure of aneurisms.

The femoral artery had been tied with two ligatures, as firmly as could be done without risk of cutting it through. "But, (says Mr. A. Cooper) as I was proceeding to dress the wound, I saw a stream of blood issuing from the artery, and when the blood was sponged away, one of the ligatures was found detached from the vessel. Soon after the other was also forced off, and thus the divided femoral artery was left without a ligature, and unless immediate assistance had been afforded him, the patient must have perished under hemorrhage."

The same kind of accident has occurred in Mr. Cline's practice.

These events naturally induced Mr. A. Cooper to reflect on the means, which were to be employed to obviate them, and the first which suggested itself was to include a larger portion of the artery between the two ligatures. But this plan was given up, when it was recollected, that many branches of arteries must be divided, and that it was a mode of security (if it was so) which could only apply to particular cases of aneurism, since in some situations of that disease, there is scarcely any length of vessel between the tumour and a principal anastomosing branch of the artery.

Mr. A. Cooper thinks, that a plan of greater security, and more general application, consists in conveying the ligatures, by means of two blunt needles under the artery, an inch asunder, and close to the coats of the vessel, excluding the vein and nerve, but passing the threads through the cellular membrane surrounding the artery. When these are tied, and the artery is divided between them, the ligatures will be prevented from slipping from the artery by the cellular membrane through which they are passed. Mr. A. Cooper next relates a case of aneurism after bleeding, which he cured by this way of operating.

"But although this plan, as to the event, answered my expectations, yet a different mode of securing the ligature, suggested to me by my young friend Mr. H. Cline, struck me so forcibly for its simplicity and security, that I felt immediately disposed to adopt it."

Mr. A. Cooper put the new plan to the test of experiment in operating for a popliteal aneurism on Henry Figg, aged 29. "An incision being made on the middle of the inner part of the thigh, and the femoral artery exposed, the artery was separated from the vein and nerve, and all the surrounding parts, to the extent of an inch, and an eye-probe, armed with a double ligature, having a curved needle at each end, was conveyed under the artery, and the probe cut away. The ligature nearest the groin was first tied; the other was separated an inch from the first, and tied also. Then the needles were passed through the coats of the artery, close to each ligature and between them. The thread they carried, was tied into the knot of the ligature, which had been already secured around the vessel; and thus a barrier was formed in the artery, beyond which the ligature could not pass." The event of this operation was successful. (*Med. and Phys. Journ. Vol.* 8.)

Upon the foregoing proposal a few ob-

servations are necessary, and these I shall offer with due deference to the eminent character, whose fame alone has attached undue importance to the innovation.

In the first place I shall prove that Mr. H. Cline's proposal is not an original one. It appears to have been mentioned by Dionis, and to have been noticed by some subsequent writers. In the 13th chapter, on hemorrhage, in Richter's *Anfangsgrunde der Wundarzneykunst*, we read the following passage. *Die hervorgezogne Schlagader umwickelt man mit dem gewöhnlichen Faden zweymal, befestigt denselben mit einem Knoten, ziehet darauf, wenn die Schlagader gross ist, vermittelst einer Nadel ein ende des Fadens vor der Unterbindung durch dieselbe, knüpft beyde Enden zusammen, und lässt sie wie gewöhnlich herabhängen. Dritte Auflage.* 1799. "The artery, when drawn out, is to be twice surrounded with the common ligature. This is to be tied in a knot, and when the artery is large, one end of the ligature is to be passed, by means of a needle, through the vessel before the knot, then both ends are to be tied together, and left hanging out of the wound, as in the ordinary way." Edition 3. 1799. In making this quotation, my object is to remove the supposition, that the world is indebted to Mr. H. Cline for the suggestion, if we may use the term indebted, when the plan has certainly very little merit, and would undoubtedly never have acquired much celebrity, had not Mr. A. Cooper's name been coupled with it.

What power can possibly force the ligature, when tied with due tightness, off the extremity of the vessel? If Mr. A. Cooper had reflected a little, he would have seen, that no action of the heart, or artery itself, no turgid state of this vessel, could do so. If a piece of string were tied round any tube for the purpose of preventing a fluid from escaping from its mouth, provided the string is applied with due tightness, no fluid can possibly escape, however great the propelling power may be, supposing that the string, and structure of the tube, do not break. If the ligature be applied so slackly as to slip, who can doubt, that a hemorrhage will still follow, even though the ligature is carried through the end of the vessel, and tied in the way mentioned above.

In the cases, in which the ligatures slipped off, as mentioned by Mr. A. Cooper, we must, therefore, conclude that the arteries were not tied with sufficient tightness, perhaps through an unfounded fear that a ligature, might cut its way completely through all the coats of an artery. The inner coats of the artery we know, from the experiments of Dr. Jones, are invariably cut through when the vessel is properly tied, and the circumstance is always useful in promoting its closure.

OF ANEURISMS HIGH UP THE FEMORAL ARTERY.

Mr. Abernethy has been called upon in at least four cases to take up the external iliac artery. The events of all these have shewn, that the anastomosing vessels were fully capable of conveying blood enough into the limb below, and that a vessel even of this size could become permanently closed after being tied. Messrs. Freer and Tomlinson, of Birmingham, have both also done the same operation with success. Our limits, however, will only allow us to describe the operation, and the particulars must be consulted in *Abernethy's Surg. and Physiol. Essays; his Surgical Observations*, 1804; *Edinb. Med. and Surg. Journal for January*, 1807; *and Freer's Observations on Aneurism*, 1807.

In Mr. Abernethy's first operation of this kind, an incision, about three inches in length, was made through the integuments of the abdomen, in the direction of the artery, and thus the aponeurosis of the external oblique muscle was laid bare. This was next divided, from its connexion with Poupart's ligament, in the direction of the external wound, for the extent of about two inches. The margins of the internal oblique and transverse muscles being thus exposed, Mr. Abernethy introduced his fingers beneath them to protect the peritoneum, and then divided them. Next he pushed this membrane with its contents upwards and inwards, and took hold of the external iliac artery with his finger and thumb. It now only remained to pass a ligature round the artery, and tie it; but, this required caution, on account of the contiguity of the vein to the artery. These Mr. A. separated with his fingers, and introducing a ligature under the artery with a common surgical needle, tied it about an inch and a half above Poupart's ligament. (*Surg. Essays.*)

The following was the method Mr. Abernethy adopted the second time of tying the external iliac artery.

An incision of three inches in length was made through the integuments of the abdomen, beginning a little above Poupart's ligament, and being continued upwards; it was more than half an inch on the outside of the upper part of the abdominal ring, to avoid the epigastric artery. The aponeurosis of the external oblique muscle being thus exposed, was next divided, in the direction of the external wound. The lower part of the internal oblique muscle was thus uncovered, and

the finger being introduced below the inferior margin of it and of the transversalis muscle, they were divided with the crooked bistoury for about one inch and a half. Mr. Abernethy now introduced his finger beneath the bag of the peritoneum, and carried it upwards by the side of the psoas muscle, so as to touch the artery about two inches above Poupart's ligament. He took care to disturb the peritoneum as little as possible, detaching it to no greater extent than would serve to admit his two fingers to touch the vessel. The pulsations of the artery made it clearly distinguishable, but Mr. Abernethy could not get his finger round it with facility. He was obliged to make a slight incision on either side of it, in the same manner as is necessary when it is taken up in the thigh, where the fascia which binds it down in its situation is strong. After this the forefinger could be put beneath the artery, which Mr. A. drew gently down, so as to see it behind the peritoneum. By means of an eye-probe, two ligatures were conveyed round the vessel; one of these was carried upwards as far as the artery had been detached, and the other downwards: they were firmly tied, and the vessel was divided in the interspace between them. (*Surg. Observ.* 1804.)

Mr. Abernethy, in his third instance of tying this vessel, operated exactly as in the foregoing case, and with complete success. (See *Edinb. Surg. Journ. Jan.* 1807.)

Mr. Freer, in his operation, made an incision about one inch and a half from the spine of the ilium, beginning about an inch above it, and extending it downwards about three inches and a half, so as to form altogether an incision four inches and a half long, extending to the base of the tumour. The tendon of the external oblique being exposed, was carefully opened, and also the internal oblique, when the finger was introduced between the peritoneum and transversalis, and served as a director for the crooked bistoury, which divided the muscle. Avoiding all unnecessary disturbance, Mr. Freer separated the peritoneum with his finger, till he could feel the artery beating, which was so firmly bound down, that he could not get his finger under it without dividing its fascia. The vessel being separated from the surrounding parts, a curved blunt needle, armed with a strong ligature was put under it, and tied very tight, with the intention of dividing the internal coats of the vessel. The operation led to a perfect cure. (*Freer on Aneurism, p.* 83.)

Mr. Tomlinson applied only one ligature, and, of course, left the artery undivided: the event was attended with perfect success.

Since the first edition of this publication, the operation of tying the external iliac artery has been performed in numerous examples, and, I am happy to say, that most of the events of these cases have been highly favourable to a continuance of the practice. Mr. Astley Cooper has taken up this vessel in several instances, and saved his patients from imminent death. Even on the other side of the Atlantic, the operation has now been practised with the most successful consequences. Such facts must be highly gratifying to Mr. Abernethy, through whose judgment and boldness, the method was first suggested and practised. In my opinion, had this gentleman made no other improvement in his profession, this alone ought to crown him with unfading honours. The practice seems to astonish our neighbours, who appear almost to withhold their belief: "*Lorsqú un aneurisme a commencé vers la partie la plus élevée de la crurale, au moment même ou elle vient de sortir de l'abdomen, peut-on se permettre d'inciser la partie inférieure de cette cavité, de couper l'arcade crurale, et de chercher l'artère iliaque externe, pour l'embrasser par la ligature? S'il en fallait croire des observations inserées dans la Bibliothèque britannique, cette operation hardie aurait été faite avec succès à Londres, par le docteur Abernethy, dans un cas d'anévrisme du commencement de la crurale; ce praticien n'hésita pas, dit on, de pénétrer dans le bassin, en incisant le ligament de Fallope; mais, en mettant de côté la difficulté de l'operation dans laquelle on estobligé de travailler en sous-œuvre, et sans que la vue puisse guider l'aiguille, que l'on passe autour du vaisseau, la ligature simultanée, de la veine iliaque, et des nerfs placés sur les côtés du détroit supérieur du bassin, occasionnera la gangrène. Quels vaisseaux continueront à nourrir le membre dans le défaut presque absolu d'onastomoses? Enfin, dans la supposition peu probable, qu'il ne tombât pas en gangrène, des hernies énormes seraient l'inevitable resultat de l'affaiblissement des parois abdominales.*" (*Richerand, Nosographie Chirurgicale, Tom.* 4, *p.* 106—107, *edit.* 2.)

In this passage, M. Richerand is full of error; he supposes an easy operation difficult; he forgets all the anastomosing arteries, which are branches of the internal iliac, and emerge from apertures of the pelvis; and he is impressed with a thorough expectation of gangrene, herniæ, &c. which, in fact, have never arisen, in consequence of this operation. But, it is enough to say in reply to this gentleman, that he is arguing against cases, many of which were in public hospitals, and seen by hundreds of spectators.

Some of the cases, on which Mr. Abernethy operated, I was an eyewitness of, and can therefore bear testimony to the

ease and simplicity of the necessary operation. The external iliac artery was most readily tied the beginning of the present year, 1812, by Mr. Ramsden, when the aneurismal swelling rose much higher than Poupart's ligament. The patient, it is true, died; but, his age was not less than 70; and, yet, notwithstanding this circumstance, the limb had a full supply of blood, and not the least tendency to gangrene shewed itself.

The many operations, which have now been done on the external iliac artery, have impressed me with a conviction, that, in subjects under a certain age, there is no reason to fear, that the anastomoses, will not suffice for the supply of the lower extremity. I have heard of no instance to the contrary, and, should such an event ever happen, it cannot be common, nor ought it, as, being only an unusual occurrence, to be admitted as a just reason for delay, until the collateral vessels have had time to enlarge. I believe, that, in all aneurismal diseases, early operating is the best, and most judicious practice. I say this, not without recollecting, that all aneurisms are attended with a chance of getting spontaneously well in time. I saw the inguinal aneurism, which did so, under Mr. Albert, in the York Hospital; but as this also is a rare incident, I do not believe that it ought to influence us against having speedy recourse to an operation. Besides, the cure by inflammation and sloughing, appears to me to be attended in reality with more peril, than a well executed operation, and, consequently, has less recommendations, than many may imagine. Had not Mr. Albert's patient been a very strong man, he would certainly have fallen a victim to the extensive disease, which the bursting and sloughing of the tumour created.

ANEURISMS OF THE BRACHIAL ARTERY, AND THE OPERATION FOR THEM.

Surgical writings contain many histories of aneurisms in the bend of the arm, produced by the puncture of the brachial artery in venesection, or caused by a deep wound inflicted at the bend of the arm, along the inner side of the humerus, or in the axilla. Such cases must indisputably be formed by effusion. Although Morand, &c. have found, that along with aneurisms, caused by a wound of the brachial artery, the diameter of the vessel is sometimes unusually enlarged through its whole length, above the seat of the tumour, this enlargement, which is very rare, might have existed naturally, before the puncture occurred. Even were it frequent, such an equable longitudinal expansion of the tube of the artery could not explain the formation of the aneurismal sac in the bend of the arm, along the inner side of the humerus, or in the axilla, after wounds. (*Scarpa*, *p.* 160.)

The proximate cause of these cases may invariably be traced to the solution of continuity in the two proper coats of the artery, and the consequent effusion of blood into the cellular substance. The effect is the same, whether from an internal morbid affection, capable of ulcerating the internal and fibrous coats of the artery, the blood be effused into the neighbouring cellular sheath surrounding the artery, which it raises after the manner of an aneurismal sac; or, the wound of the integuments having closed, the blood issue from the artery, and be diffused in the surrounding parts. The cellular substance, on the outside of the wounded vessel is first injected, as in ecchymosis; the blood then distends it, and elevates it in the form of a tumour, and, the cellular divisions being destroyed converts it at last into a firm capsule, or aneurismal sac. (*Scarpa*, *p.* 167.)

The circumscribed or the diffused nature of the aneurism, and the rapidity or slowness of its formation, depend on the greater or less resistance to the impetus of the blood, during the time of its effusion, by the interstices of the cellular substance surrounding the artery, and by the ligamentous fasciæ and aponeuroses, lying over the sac. The aponeurosis of the biceps muscle, being only half an inch broad, and situated lower than the common place for bleeding, cannot, at least, in most cases, materially strengthen the cellular substance surrounding the artery, as is commonly supposed. (*Scarpa*, *p.* 168—170.) This author refers the greatest resistance to the intermuscular ligament, which after having covered the body of the biceps muscle extends over the whole course of the humeral artery, and is implanted into the internal condyle. This ligamentous expansion has a triangular shape, the base of which extends from the tendon of the biceps, to the internal condyle, while the apex reaches upward along the inner side of the humerus towards the os brachii. The humeral artery and median nerve, kept in their situation by the cellular sheath, and this ligamentous expansion run in the furrow, formed between it and the internal margin of the biceps. (*Scarpa*, 171.) This author anatomically explains many circumstances relative to the diffusion, circumscription, shape, &c. of brachial aneurisms, from this intermuscular ligament. While aneurisms, from an internal cause, are not unfrequent in the aorta, thigh, and ham, they are very rare in the brachial artery; but, such instances, however, are recorded. (*Scarpa*, 174.)

The mode of distinguishing a wound of the brachial artery, in attempting to bleed, and the method of trying to effect a cure by pressure, are described in the article *Hemorrhage*.

Anel is said to have been the first who tied the brachial artery, for the cure of aneurisms in the arm, in the same way that Hunter did the femoral, for the cure of those in the ham, viz. with one ligature above the tumour, without making any incision upon, or into, the sac itself.

The operation is performed as follows:—the surgeon having traced the course of the brachial artery, and felt its pulsations above the aneurism, he may either cut down to the vessel immediately above the tumour, or much higher in the long space between the origins of the superior and inferior collateral arteries. The integuments are to be divided in the course of the artery, and also the cellular sheath, for the space of about two inches and a half. The surgeon now introducing his left fore-finger to the bottom of the wound, will feel the denuded vessel, and, if it is not sufficiently bare, he must divide the parts which still cover it, observing to introduce the edge of the knife, on the side next to the internal margin of the biceps, to avoid dividing any of the numerous muscular branches, which go off from the opposite side of the artery. He is then to insulate, with the point of his finger, the trunk of the vessel, alone if he can, or together with the median nerve and vein, and raise it a little from the bottom of the wound. He is to separate the median nerve and vein, for a small space from the artery, and with an eyed needle is to pass a ligature under the latter, and then tie it with a simple knot.

Whoever, after these directions, says Scarpa, shall have the treatment of a *circumscribed* aneurism in the bend of the arm, will no longer, it is to be hoped, follow the method of those, who, supposing the tumour to be formed by the dilatation of the artery, used first to divide the integuments over the tumour, insulated the sac, and sought for the vessel above and below the aneurism, in order to tie it in two places; and then endeavoured to make the sac slough away. The operation is now reduced to the greatest simplicity, viz. tying the artery merely above the tumour. (See *Scarpa*, p. 358, 359.)

When the aneurism is *diffused*, and accompanied with violent inflammation and swelling of the whole arm, from the excessive distention of the clots of effused blood, Scarpa recommends the old operation of opening the tumour, and tying the artery at the bottom of the sac, above and below the wound made by the lancet. In this method it will be proper to apply a tourniquet to the upper part of the arm, near the axilla; or, if the limb should be very painful and swelled, it is better to let an assistant compress the artery from above the clavicle, against the first rib. The incision having been made into the tumour, and the blood discharged, a probe is to be introduced into the puncture in the vessel, from below upwards, so as to raise the artery. This, being separated from the parts beneath, and the median nerve, for a small extent, is to have two ligatures put under it, one of which is to be tied above, the other below, the wound in the vessel. Then the tourniquet, or pressure, is to be taken off, and if there be no bleeding, the wound is to be brought together. (See *Scarpa*, p. 359.)

MR. LAMBERT'S PROPOSAL.

Having observed, after an operation performed in the common way, by a ligature above and below the aperture in the artery, such violent pain, swelling and inflammation, as threatened gangrene of the limb, and which symptoms, when mitigated, left the arm weak, and with a much more feeble pulse, than in the other arm, this gentleman wished to see the operation done, so as to make less disturbance of the circulation. "I recollected," he remarks, "all that I had seen or read of the effects of styptics, of pressure, and of ligatures, in the cure of hemorrhages. I considered the coats and motions of arteries, and compared their wounds with the wounds of veins and other parts I reflected upon the process of nature in the cure of wounds in general, and considered, in particular, how the union of divided parts was brought about in the operation of the harelip, and in horses necks, that are bled by farriers. Upon the whole, I was in hopes, that a suture of the wound in the artery might be successful; and, if so, it would certainly be preferable to tying up the trunk of the vessel. I communicated my thoughts to Mr. Hallowell, Mr. Keenlyside, and some other friends of the profession. A case of an aneurism from bleeding occurred, and fell to Mr. Hallowell's lot. I recommended the method I have hinted. He put it in execution June 15, 1759. Every thing was done in the usual method, till the artery was laid bare, and its wound discovered; and the tourniquet being now slackened, the gush of blood *per saltum* shewed there was no deception. Next, two ligatures, one above the orifice, and one below, were passed under the artery, that they might be ready to be tied at any time, in case the method proposed should fail. Then a small steel pin, rather more than a quarter of an inch long, was passed through the two lips of

the wound in the artery, and secured by twisting a thread round it, as in the hare-lip. This was found to stop the bleeding, upon which the arm was bound up, the patient put to bed, and ordered to be kept quiet, &c. The pin came away with the dressings, June 29, and July 19th, the patient was discharged from the hospital perfectly well, and with a pulse in that arm nearly as strong as in the other. Indeed, the pulse was very little altered immediately after the operation; it was weakened in a small degree, as might be expected from the diameter of the vessel being straitened; but it was so strong and equal, that we had not the least doubt of the blood's continuing to circulate freely through it." (*Medical Observations and Inquiries Vol.* 2.)

We need hardly inform the reader, that the idea of healing the wound in the vessel, so as to preserve the pervious state of it, is a mere hypothesis, certainly never realized by adopting Mr. Lambert's method. If ever a small puncture of an artery heals, so as to leave the tube pervious, it is under the circumstances pointed out by Dr. Jones. (*See Hemorrhage.*) Had Lambert had an opportunity of examining the state of the vessel, sometime after the above operation, he would have found its canal obliterated; and the preservation of the perviousness of the artery being the only foundation for Lambert's method, the practice must of course fall to the ground.

AXILLARY ANEURISMS.

Aneurisms occasionally take place in the axilla, and rather than that the patient should perish of hemorrhage, it is the duty of the surgeon to tie the subclavian artery, if it be necessary, even as far inward, as where it proceeds over the first rib. A question, which here naturally presents itself is, whether the surgeon should attempt the operation in an early period of the disease, or wait till circumstances are urgent; the aneurism large and far advanced; the arm œdematous and insupportably painful; and the tumour in danger of bursting? It cannot be denied, that, in all cases of aneurism, there is a certain chance of the disease getting spontaneously well; and one axillary aneurism in a man in St. Bartholomew's Hospital a few years ago, had certainly disappeared of itself, as was proved by the account which the man gave of the case while living, and by the obliteration of the artery, found on inspection after death.

I believe, however, we ought not to suffer our conduct to be too much influenced by the hope of so unfrequent an event, and, from the observations, which I have made on this subject, I am now decidedly of opinion, that the operation should never be delayed, so as to allow the tumour to acquire an immoderate size. The operation is always difficult; but, the difficulty is seriously increased, when the swelling has extended far towards the breast, and has become so large as to push considerably upwards the clavicle. The memorable and interesting examples, in which Mr. Keate and Mr. Ramsden tied the subclavian artery, have shewn, that the anastomoses are fully competent for the supply of the limb with blood, and, I think, that delaying the operation, with a view of allowing the inosculating arteries to enlarge, is not necessary, and, as giving time for the swelling to increase, ought to be condemned. At all events, the tumour should never be suffered to acquire an enormous size.

A wound of the axillary artery, might render it necessary to do this operation. This vessel was tied by a Mr. Hall, in Cheshire, when it had been wounded with a scythe, so as to bring the ends of the artery into view; and the arm was preserved, though it remained afterwards a little weak, which, indeed, might be owing to some large nerve being divided. (See *Scarpa, p.* 372.) Mr. White, of Manchester, relates another instance of this vessel being tied, in the case of a wound; but, mortification of the limb, and death followed. Three of the nerves were found included in the ligature. (*London Medical Journal, Vol.* 4.)

There are two modes of operating for axillary aneurisms; one by cutting below the clavicle; the other by making the wound above this bone.

The first of these methods has been attempted in France by Desault and Pelletan. The former undertook the operation in a case, where the axillary artery had been wounded. An incision, six inches long, was made below the external third of the clavicle; two thoracic arteries cut were immediately tied; the two lower thirds of the great pectoral muscle were next divided with a bistoury guided on a director; a large quantity of coagulated blood was now discharged; and the artery was directly taken hold of, and tied, together with the brachial plexus of the nerves. The arm mortified, and the patient died. This case, we must agree with Scarpa, was not a fair trial of the operation, inasmuch as the inclusion of the plexus of nerves in the ligature was an improper measure, and must have promoted the occurrence of sphacelus. It seems also probable from the account, that the vein was likewise tied; another serious and objectionable proceeding. Besides, it is worthy of notice, that the

case was a wound of the axillary artery, attended with a copious effusion of blood in the cellular membrane. In all examples of this kind, gangrene is more readily induced, than when the case is a mere circumscribed aneurismal tumour. (See *Œuvres Chir. de Desault par Bichat, Tome* 2, *p.* 553.) As for Pelletan's example, it hardly deserves recital, because the operation in fact was not achieved. His colleagues objected to dividing the pectoral muscle; a random thrust was made with a needle and ligature; but the artery was not included, and the experiment was not repeated. (See *Clinique Chirurgicale, Tom.* 2, *Obs.* 7, *p.* 49.)

In a case of axillary aneurism, which had actually burst, and the hemorrhage from which could only be stopped by pressing the artery against the first rib, Mr. Keate, the surgeon-general, practised the following operation, which was attended with completely successful consequences. This gentleman determined on taking up the artery, above the diseased and ruptured part, in its passage over the first rib. Accordingly, he made an incision obliquely downwards, divided the fibres of the pectoral muscle, that were in his way, and, when he came to the artery, passed a curved, blunt-pointed, silver needle, armed double, as he conceived, under the artery, and tied two of the ends. After a careful examination, finding that the artery pulsated below the ligature, he determined on passing another ligature higher up, and nearer to the clavicle: he, therefore, passed the needle more deeply, so as evidently to include the artery. In a few days the swelling of the arm began to subside, the wound suppurated, and the ligatures came away with the dressings. The arm afterwards recovered its feeling, and the patient regained, in a great measure, the entire motion of the shoulder, &c. (See *Med. Review and Magazine for* 1801.)

Mr. Keate's operation is objectionable, inasmuch as it was a dive made with a needle, and attended with great danger of wounding and tying parts, which should be left undisturbed.

The subclavian artery might be got at below the clavicle, as follows: the surgeon is to make an incision, through the integuments, about an inch from the sternal end of this bone. The cut is to run in the direction towards the acromion, deviating a little downward from a line parallel to that of the clavicle. This wound will bring into view some fibres of the great pectoral muscle originating from the last mentioned bone. These are next to be divided. Some cellular substance will be found underneath, which is to be carefully raised with a pair of dissecting forceps, and cut. The operator will thus arrive at the great subclavian vein, and cephalic vein uniting with it. Under the subclavian vein, and a little further backward, more under the clavicle, the subclavian artery may be felt and tied. (See *Charles Bell's Operative Surgery, Vol.* 2. *p.* 370.)

The axillary artery may be got at by making an incision above the clavicle, and it is undoubtedly not a very difficult plan to accomplish in the dead subject, without any tumour under the clavicle. But it is more difficult in a living subject, having a large axillary aneurism; for, then the clavicle becomes so much elevated, and the artery lies so deeply below it, that the vessel can hardly have a ligature carried under it, without a particular needle for the purpose. This was the case in an attempt which I once saw made to tie the artery, and in which one of the cervical nerves, affected by the pulsation of the artery, was mistaken for it, and tied, so that the aneurism soon afterwards burst, and a fatal hemorrhage arose. Were a surgeon to operate above the clavicle, he should adopt the following plan:—An incision should be made just over the sternal end of the clavicle, and the clavicular portion of the sterno-cleido-mastoideus muscle be detached with a blunt pointed curved bistoury. No further use should be made of a cutting instrument. The chief difficulty would now be, to get a ligature under the artery; but, it may be done with the aid of an ingenious needle, which Mr. Ramsden has described, and which is exactly similar in principle to one employed by Desault, called by the French, *aiguille à ressort*. As the artery communicates its pulsations to the cervical nerves in the vicinity, the operator should be particularly careful not to mistake one of them for the vessel itself.

In order to avoid the inconveniences of the needles ordinarily used for conveying ligatures under deep arteries, Desault (says Bichat) invented "une aiguille à ressort," composed of a silver tube, or sheath, which was straight at one end, and bent at the other in a semicircular form. This sheath enclosed an elastic wire, the projecting extremity of which was accurately fitted to the end of the sheath, and perforated with a tranverse eye. The instrument was passed under the artery, and, as soon as it had reached the other side of the vessel, the sheath was kept fixed, while an assistant pushed the elastic wire, which, rising from the bottom of the wound, presented the aperture or eye to the surgeon, who now passed the ligature through this opening. The wire was next drawn back into its sheath again, and the whole instrument brought from beneath the artery, by

which means, the ligature was conveyed under the vessel. (See *Œuvres Chir. de Desault, par Bichat, Tom. 2, p. 560.*)

The invention of this needle makes a material diminution in the difficulty of taking up the subclavian artery from above the clavicle; nor, can it be wondered, that, without such an instrument, the operation should have baffled even so skilful a surgeon as Mr. A. Cooper.

The following example is the first in which the attempt to tie the subclavian artery, by cutting above the clavicle, was ever accomplished. I conceive, that, it reflects great honor on Mr. Ramsden, who undertook it, and who preferred exposing himself to a failure, rather than omit the only possible means of saving his patient from an imminent death.

John Townly, a tailor, aged thirty-two years, addicted to excessive intoxication, of an unhealthy and peculiarly anxious countenance, was admitted into St. Bartholomew's Hospital, on Tuesday, the 2d of November, 1809, on account of an aneurism in the axilla of his right arm, which had been coming on about four months. The prominent part of the tumour in the axilla was about half as big as a large orange, and there was also much enlargement and distention underneath the pectoral muscle, so that the elbow could not be brought near the side of the body.

"The temperature of both arms," says Mr. Ramsden, "was alike, and the pulse in the radial artery of each of them was correspondent. After the patient had been put to bed, some blood taken from the left arm, and his bowels emptied, his pulse, which, on his admission had been at 130, became less frequent; his countenance appeared more tranquil; and he experienced some remission of the distressing sensations in the affected arm: this relief, however, was of short duration; the weight and incumbrance of his arm soon became more and more oppressive, and, in resistance to every medical assistance, his nights were again passed without sleep, and his countenance reassumed the anxiety, which had characterized it, when he first presented himself for advice.

"On the sixth day, after his admission, his decline of health became so very evident, and the progressive elevation of the clavicle, from the increasing bulk of the tumour, was so decidedly creating additional difficulties to any future operation, that I considered it necessary to convene my colleagues, and avail myself of their opinions, as to the propriety of performing the operation; when it was agreed in consultation, that as the tumour, (although increasing) did not appear immediately to endanger the life of the patient, from any probability of its bursting suddenly, it would be adviseable yet to postpone the operation, for the purpose of allowing the greatest possible time for the anastomosing vessels to become enlarged; and, in the meanwhile, that the case should be most vigilantly watched.

"About this period of the case, the pulsation of the radial artery of the affected arm gradually became more obscure, and soon after either ceased entirely, or, what is more probable, was lost in the succeeding œdema of the forearm and hand, both of which became loaded to a great extent.

"Notwithstanding the aneurismal tumour had continued to increase, and the patient's health had proportionately declined, yet no particular alteration was observed on the integuments, until I visited him in the evening of the twelfth day after his admission, when I found him complaining of more than usual weariness and weight in the affected limb, and painfully impatient from the impossibility, as he described it, of finding a posture for the arm.

"On examining the tumour, a dark spot appeared on its centre, surrounded by inflammation, which threatened a more extensive destruction of the skin. Under these symptoms and appearances, no farther postponement of the operation being admissible, I performed it the next day in the following manner:

"The patient being placed upon an operating table, with his head obliquely towards the light, and the affected arm supported by an assistant at an easy distance from the side, I made a transverse incision through the skin and platysma myoides along and upon the upper edge of the clavicle, of about two inches and a half in length, beginning it nearest to the shoulder, and terminating its inner extremity at about half an inch within the outward edge of the sterno-cleido-mastoideus muscle. This incision divided a small superficial artery, which was directly secured. The skin, above the clavicle, being then pinched up, between my own thumb and finger, and those of an assistant, I divided it, from within, outwards and upwards, in the line of the outward edge of the sterno-cleido-mastoideus muscle, to the extent of two inches.

"My object, in pinching up the skin for the second incision was to expose at once the superficial veins, and by dissecting them carefully from the cellular membrane, to place them out of my way, without wounding them. This provision proved to be very useful, for it rendered the flow of blood during the operation very trifling comparatively with what might otherwise have been expected;

and, thereby, enabled me with the greatest facility to bring into view those parts, which were to direct me to the artery.

"My assistant having now lowered the shoulder, for the purpose of placing the first incision above the clavicle, (which I had designedly made along and upon that bone) I continued the dissection with my scalpel, until I had distinctly brought into sight the edge of the anterior scalenus muscle, immediately below the angle, which is formed by the traversing belly of the omo-hyoideus and the edge of the sterno-cleido-mastoideus, and having placed my finger on the artery, at the point where it presents itself between the scaleni, I found no difficulty in tracing it without touching any of the nerves to the lower edge of the upper rib, at which part, I detached it with my finger nail for the purpose of applying the ligature.

"Here, however, arose an embarrassment, which (although I was not unprepared for it) greatly exceeded my expectation. I had learned from repeatedly performing this operation, many years since, on the dead subject, that to pass the ligature under the subclavian artery, with the needle commonly used in aneurisms, would be impracticable; I had therefore, provided myself with instruments of various forms and curvatures to meet the difficulty, each of which most readily conveyed the ligature underneath the artery; but, would serve me no farther; for, being made of solid materials, and fixed into handles, they would not allow of their points being brought up again at the very short curvature, which the narrowness of the space, betw en the rib and the clavicle afforded, and which, in this particular case, was rendered of unusual depth, by the previous elevation of the shoulder by the tumour.

"After trying various means to overcome this difficulty, a probe of ductile metal was at length handed me, which I passed under the artery, and bringing up its point with a pair of small forceps, I succeeded in passing on the ligature, and then tied the subclavian artery at the part, where I had previously detached it for that purpose. The drawing of the knot was unattended with pain, the wound was closed by the dry suture, and the patient was then returned to his bed." (See *Practical Observations on the Sclerocele, &c. to which are added four cases of operations for Aneurism, by Thomas Ramsden, surgeon to Christ's Hospital, &c. p.* 276, *&c.*)

It only seems necessary for me to add, that immediately, the artery was tied, the pulsation of the swelling ceased; that the arm of the same side continued to be freely supplied with blood, and was even rather warmer than the opposite arm; that the operation, which was severe from the length of time it took up, was after a time followed by considerable indisposition; that the patient died about five days after its performance; that, after the artery had been tied, the œdema of the arm, and the aneurismal tumour partly subsided; and, that, on examination after death, nothing, but the vessel, was found included in the ligature.

The case, in my opinion, does Mr. Ramsden great honor; for, the difficulty he had to encounter in conveying the ligature under the artery was such as would have baffled all men of ordinary manual dexterity. In this gentleman's publication are descriptions of instruments, which will be of great service to any future performer of this operation. The chief one is a needle, resembling that, which was invented and used by Desault, and of which I have already endeavoured to give an idea. By means of this instrument, I conceive, that the main difficulty of the operation will for the future be no longer experienced. Had Mr. Ramsden had its assistance, his patient would have been detained a very little time in the operating theatre, and the event of the case might have been completely successful. Having witnessed all the circumstances of the case, the inference, that I drew from them was, that, if the operation could have been done in a moderate time, which now seems practicable with the aid of the aiguille à ressort, the case in all probability would have ended well. The preceding case is particularly memorable, as being the first instance, in which the subclavian artery has been scientifically tied, without any random thrust of a needle, and without the inclusion of any part besides the artery in the ligature. It is a fact, that furnishes an encouragement to repeat the experiment, holds out the hope, that axillary aneurisms may hereafter be cured as well as inguinal ones; and confirms the competency of the anastomosing arteries to nourish the whole upper extremity, when the subclavian is tied where it emerges from behind the anterior scalenus muscle.

CAROTID ANEURISMS.

The possibility of tying the carotid artery, in cases of wounds and aneurisms, without any injurious effect on the functions of the brain, now seems completely proved. Petit mentions, that the advocate Vieillard, had an aneurism at the bifurcation of the right carotid, for the cure of which he was ordered a very spare diet, and directed to avoid all violent exercise. Three months after this prescription, the tumour had evidently diminished; and, at last, it was converted into a small,

hard, oblong, knot, without any pulsation. The patient having died of apoplexy, the right carotid was found closed up and obliterated, from its bifurcation, as low down as the right subclavian artery.—(*Acad. des Sciences de Paris, an.* 1765.) Hebenstreit, vol. 5, of his Translation of B. Bell's Surgery, mentions a case, in which the carotid artery was wounded, in extirpating a scirrhous tumour. The hemorrhage would have been fatal, had not the surgeon immediately tied the trunk of the vessel. The patient lived many years afterwards.

Dr. Baillie knew an instance, in which one carotid was entirely obstructed, and the diameter of the other considerably lessened, without any apparent ill effects on the brain. (See *Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge, Vol.* 1. *p.* 121.) Mr. Astley Cooper has also recorded an example, in which the left carotid was obstructed by the pressure of an aneurism of the aorta. (See *Medico-Chirurgical Transactions, Vol.* 1. *p.* 223.)

Mr. Abernethy was under the necessity of tying the trunk of the carotid, in the case of a large, lacerated wound of the neck, in which accident the internal carotid, and all the branches in front of the external one, were wounded. The patient seemed to be going on very well at first, but in the night he became delirious and convulsed, and died about thirty hours after the ligature was applied. Mr. A. considers the delirium and the inflammatory appearance found on the brain, on opening the body, as effects of stopping the supply of blood to the brain. I was fortunate enough to be a spectator of this interesting case, and, with due deference to Mr. Abernethy, cannot help thinking, especially when the above facts press on my mind, that the delirium might more properly be regarded as the consequence of so terrible a lacerated wound as this poor man received. Stopping the flow of blood to a part, has always been considered a chief means of averting inflammation of it, not bringing it on.

That the carotid may be tied without injuring the functions of the brain, and that aneurisms of this artery admit of being cured by the operation, is now fully proved.

On Friday, Nov. 1, 1805, Mr. Astley Cooper operated on Mary Edwards, aged 44, who had an aneurism of the right carotid artery. At this time, the tumour reached from near the chin to beyond the angle of the jaw, and downward to within two inches and a half from the clavicle.

The swelling had a strong pulsatory motion. The woman also complained of a particular tenderness of the scalp on the same side of the head, and of such a throbbing in the brain as prevented her from sleeping.

An incision, two inches long, was made on the inner edge of the sterno-cleido-mastoideus muscle, from the lower part of the tumour to the clavicle. This wound exposed the omo-hyoideus, and sterno-hyoideus muscles, which being drawn aside towards the trachea, the jugular vein presented itself to view. The motion of this vein produced the only difficulty in the operation, as, under the different states of breathing, the vessel sometimes became tense and distended before the knife, and then suddenly collapsed. Mr. Astley Cooper introduced his finger into the wound to keep the vein out of the way of the knife, and, having exposed the carotid artery by another cut, he passed two ligatures under this vessel by means of a curved aneurism-needle. Care was taken to exclude the recurrent nerve on the one hand, and the par vagum on the other. The ligatures were then tied about half an inch asunder; but, the intervening portion of the artery was left undivided.

The pulsation of the swelling ceased immediately the vessel was tied, and, on the day after the operation, the throbbing in the brain had subsided, while no diminution of nervous energy in any part of the body could be observed.

The patient was occasionally afflicted with bad fits of coughing; but, upon the whole went on at first pretty well. On the eighth day, however, a paralysis of the left leg and arm was noticed, attended with a great deal of constitutional irritation. Nov. 8th, the patient could move her arm rather better; but, became unable to swallow solids. Nov. 12th, the palsy of her arm had now almost disappeared. The ligatures came away. Nov. 14th, the woman was in every respect better; she swallowed with less difficulty; the tumour was smaller, and quite free from pain. On the 17th, she became very ill; the tumour increased in size, and was sore when pressed. The wound was as large as immediately after the operation, and discharged a sanious serum. Great difficulty of swallowing, and a most distressing cough, were also experienced. The pulse was ninety-six, and the left arm again very weak. On the 21st, the patient died, the difficulty of swallowing having previously become still greater, attended with a further increase of the tumour, the skin over which had acquired a brownish red colour.

On opening the swelling after death, the aneurismal sac was found inflamed, and the clot of blood in it was surrounded with a considerable quantity of pus.

The inflammation extended on the outside of the sac, along the par vagum, nearly to the basis of the skull. The glottis was almost closed, and the lining of the trachea was inflamed and covered with coagulating lymph. The pharynx was so compressed by the tumour, which had suddenly become much enlarged by the inflammation, that a bougie, of the size of a goose-quill, could hardly be introduced into the œsophagus. Mr. Astley Cooper concludes with expressing his opinion, that these causes of the fatal event might in future be avoided by operating before the tumour is of such size as to make pressure on important parts; or, if the swelling should be large, by opening it, and letting out its contents, as soon as inflammation comes on. (See *Medico-Chirurgical Transactions, Vol.* 1.)

Mr. Cline operated for a carotid aneurism, Dec. 16, 1808, in St. Thomas's Hospital. The tumour was very large, and had increased with great rapidity. The pressure of the swelling was such as to interrupt both respiration and deglutition, and to put the larynx out of its natural position. The patient had besides a frequent and troublesome cough. The pain was confined to the tumour and same side of the face.

These symptoms seemed relieved during the first twelve hours after the operation. They then became worse, particularly the cough and difficulty of breathing, and a violent irritative fever took place. The man died on the 19th of the same month. (See *London Medical Review, No.* 3.)

In the month of June 1808, Mr. Astley Cooper operated, in Guy's Hospital, on a man, aged 50, who had a carotid aneurism, attended with pain on one side of the head, throbbing in the brain, hoarseness, cough, slight difficulty of breathing, nausea, giddiness, &c. The patient got quite well, and resumed his occupation as a porter. The facial and temporal arteries of the aneurismal side of the face afterwards had no perceptible pulsation.

On the opposite side the temporal artery became unusually large. The tumour was at last quite absorbed, though a pulsation existed in it till the beginning of September. The man's intellects remained perfect; his nervous system was unaffected; and the severe pain, which, before the operation used to affect the aneurismal side of the head, never returned.

The swelling, at the time of the operation, was about as large as a pullet's egg, and situated on the left side about the acute angle, made by the bifurcation of the common carotid, just under the angle of the jaw.

Mr. Astley Cooper began the incision opposite the middle of the thyroid cartilage, at the base of the tumour, and extended the wound to within an inch of the clavicle, on the inner side of the sterno-cleido-mastoideus muscle. On raising the margin of this muscle, the omo-hyoideus could be distinctly seen crossing the sheath of the vessels, and the nervus descendens noni was also brought into view. The sterno-cleido-mastoideus was now separated from the omo-hyoideus, when the jugular vein was seen. This vessel became so distended at every expiration as to cover the artery. When the vein was drawn to one side, the par vagum was manifest, lying between this latter vessel and the carotid artery, but a little to the outer side of the artery. The nerve was easily avoided.

A double ligature was then conveyed under the artery with a blunt iron-probe. The lower ligature was immediately tied, and the upper one was also drawn tight, as soon as about an inch of the artery had been separated from the surrounding parts above the first ligature, so as to allow the second to be tied at this height. A needle and thread were passed through the vessel below one ligature, and above the other. The artery was then divided. (See *Medico. Chirurg. Transact. Vol.* 1.)

Mr. Travers, anatomical demonstrator at Guy's Hospital, tied the carotid artery in a woman, who had an aneurism by anastomosis in the left orbit. The disease had pushed the eye out of its socket. Two small ligatures were applied, which came away on the twenty-first and twenty-second day. No hemorrhage, nor impairment of the functions of the brain took place, and the disease in the orbit was effectually cured. (See *Medico-Chirurgical Transactions, Vol.* 2, *part* 1. *and the London Medical Review, No.* 7.)

In order to get at the carotid artery in the safest manner, Mr. Abernethy has recommended making an incision on that side of it next the trachea, where no important parts are exposed to injury, and then to pass a finger underneath the vessel. The par vagum must be carefully excluded from the ligature; for, to tie it would be fatal.—(*Surgical Observations*, 1804.)

ANEURISMAL VARIX, OR VENOUS ANEURISM.

The seat of this tumour is, in general, in the basilic vein, which is enlarged, so as to form an oblong swelling, in the middle of which is the scar, made by the lancet in bleeding. The tumour seldom extends more than two inches above and below the injury; beyond this distance the vein regains its natural size.

Dr. W. Hunter is undoubtedly the first

who gave an accurate description of this disease, although Professor Scarpa is disposed to claim a share of the merit for his own countryman Guattani, who, about the same time when Dr. Hunter wrote in the Medical Observations and Inquiries, published the history of two cases of aneurismal varix.

"Does it ever happen in surgery," says Dr. Hunter, "that when an artery is opened through a vein, a communication, or anastomosis, is afterwards kept up between these two vessels? It is easy to conceive this case, and it is not long, since I was consulted about one, that had all the symptoms that might be expected, supposing such a thing to have actually happened, and such symptoms, as otherwise must be allowed to be very unaccountable. It arose from bleeding; and was of some years standing, when I saw it about two years ago, and I understand very little alteration has happened to it since that time. The veins, at the bending of the arm, and especially the basilic, which was the vein that had been opened, were there prodigiously enlarged, and came gradually to their natural size, at about two inches above, and as much below the elbow. When emptied by pressure, they filled again almost instantaneously, and this happened, even when a ligature was applied tight round the forearm, immediately below the affected part. Both when the ligature was made tight, and when it was removed, they shrunk, and remained of a small size, while the finger was kept tight upon the artery, at the part where the vein had been opened in bleeding. There was a general swelling in the place, and in the direction of the artery, which seemed larger, and beat stronger, than what is natural, and there was a tremulous jarring motion in the vein, which was strongest at the part, which had been punctured, and became insensible at some distance both upwards and downwards." (*Medical Observations and Inquiries, Vol.* 1.)

In the second volume of this work, Dr. Hunter adds some further remarks on the aneurismal varix.

"In the operation of bleeding, the lancet is plunged into the artery through both sides of the vein, and there will be three wounds made in these vessels, viz. two in the vein, and one in the artery, and these will be nearly opposite to one another, and to the wound in the skin. This is what all surgeons know has often happened in bleeding, and the injury done the artery is commonly known by the jerking impetuosity of the stream, whilst it flows from the vein, and by the difficulty of stopping it, when a sufficient quantity is drawn."

"In the next place, we must suppose, that the wound of the skin, and of the adjacent, or upper side of the vein, heal up as usual; but, that the wound of the artery, and of the adjacent, or under side of the vein, remain open, (as the wound of the artery does in the spurious aneurism) and, by that means, the blood is thrown from the trunk of the artery, directly into the trunk of the vein. Extraordinary as this supposition may appear, in reality it differs from the common spurious aneurism in one circumstance only, viz. the wound remaining open in the side of the vein, as well as in the side of the artery. But this one circumstance will occasion a great deal of difference in the symptoms, in the tendency of the complaint, and in the proper method of treating it: upon which account the knowledge of such a case will be of importance in surgery."

"It will differ in its symptoms from the common spurious aneurism principally thus. The vein will be dilated, or become varicose, and it will have a pulsating jarring motion on account of the stream from the artery. It will make a hissing noise, which will be found to correspond with the pulse for the same reason. The blood of the tumour will be altogether, or almost entirely fluid, because kept in constant motion. The artery, I apprehend, will become larger in the arm, and smaller at the wrist, than it was in the natural state; which will be found out by comparing the size, and the pulse, of the artery in both arms, at these different places. The reason of which I shall speak of hereafter. And the effects of ligatures, and of pressure upon the vessels above the elbow and below it, will be what every person may readily conceive, who understands any thing of the nature of arteries and veins in the living body."

"The natural tendency of such a complaint will be very different from that of the spurious aneurism. The one is growing worse every hour, because of the resistance to the arterial blood, and if not remedied by surgery must at last burst. The other, in a short time, comes to a nearly permanent state; and, if not disturbed, produces no mischief, because there is no considerable resistance to the blood, that is forced out of the artery."

"The proper treatment must, therefore, be very different in these two cases, the spurious aneurism requiring chirurgical assistance, as much, perhaps, as any disease whatever; whereas, in the other case, I presume it will be best to do nothing."

"If such cases do happen, they will no doubt be found to differ among themselves, in many little circumstances, and particularly in the shape, &c. of the tumefied parts. Thus the dilatation of the veins may be in one only, or in several, and may

extend lower, or higher, in one case, than in another, &c. according to the manner of branching, and to the state of the valves in different arms. And the dilatation of the veins may, also, vary, on account of the size of the artery, that is wounded, and of the size of the orifice in the artery and in the vein."

"Another difference in such cases will arise from the different manner, in which the orifice of the artery may be united or continued with the orifice of the vein. In one case, the trunk of the vein may keep close to the trunk of the artery, and the very thin stratum of cellular membrane between them, may, by means of a little inflammation and coagulation of the blood among its filaments, as it were solder the two orifices of these vessels together, so that there shall be nothing like a canal going from one to the other; and then the whole tumefaction will be more regular, and more evidently a dilatation of the veins only. In other instances the blood, that rushes from the wounded artery, meeting with some difficulty of admission and passage through the vein, may dilate the cellular membrane, between the artery and vein, into a bag, as in a common spurious aneurism, and so make a sort of canal between these two vessels. The trunk of the vein will then be removed to some distance from the trunk of the artery, and the bag will be situated chiefly upon the under side of the vein. The bag may take on an irregular form, from the cellular membrane being more loose, and yielding, at one place, than at another, and from being unequally bound down by the fascia of the biceps muscle. And if the bag be very large, especially, if it be of an irregular figure, no doubt, coagulations of blood may be formed, as in the common spurious aneurism."

After relating two cases, very illustrative of the nature of the aneurismal varix, Dr. W. Hunter proceeds to enquire: "Why is the pulse at the wrist, so much weaker in the diseased arm, than in the other; surely, the reason is obvious and clear. If the blood can easily escape from the trunk of the artery directly into the trunk of the vein, it is natural to think, that it will be driven along the extreme branches with less force, and in less quantity."

2 "Whence is it, that the artery is enlarged all the way down the arm? I am of opinion, that it is the consequence of the blood passing so readily from the artery into the vein, and is such an extension, as happens to all arteries, in growing bodies, and to the arteries of particular parts, when the parts themselves increase in their bulk, and, at the same time, retain a vascular structure. It is well known, that the arteries of the uterus grow much larger in the time of utero-gestation. I once saw a fleshy tumour upon the top of a man's head, as large nearly as his head; and his temporal and occipital arteries, which fed the tumour, were enlarged in proportion. I have observed the same change in the arteries of enlarged spleens, testes, &c. so that I should suppose it will be found to be universally true in fact, and the reason of it in theory seems evident." (See *Medical Observations and Inquiries, vol.* 2.)

Professor Scarpa, Dr. Hunter, Mr. B. Bell, Pott, and Garneri, mention cases of the aneurismal varix, which remained stationary for fourteen, twenty, and thirty-five years. Several cases are related by Brambilla, Guattani, and Monteggia, of a cure having been obtained by means of compression. But, as this method of cure, if it does not succeed, exposes the patient to the danger of a complication of the disease with an aneurism, it ought not to be employed, except in recent cases, where the tumour is small, and in slender patients, at an early period of life, and where both of the vessels can be compressed accurately against the bone. If the disease is complicated with an aneurism, which threatens to become diffused, we are under the necessity of having recourse to an operation. (*Scarpa on Anatomy, &c. of Aneurism.*)

ANEURISM FROM ANASTOMOSIS.

This is the term which Mr. John Bell, of Edinburg, has given to a species of aneurism, which resembles such bloody tumours, (*nævi materni*) as appear in new-born children, grow to a large size, and, ultimately bursting, emit a considerable quantity of blood.

We find clear descriptions of this disease in writers, though before the publication of Mr. John Bell's Principles of Surgery, it was not classed with aneurisms. Thus, Desault has recorded a case of this affection, for the express purpose of proving, that pulsation is an uncertain sign of the existence of an aneurism. (See *Parisian Chirurgical Journal, Vol.* 2, *p.* 73.)

The aneurism from anastomosis often affects adults, increasing from an appearance like that of a mere speck, or pimple, to a formidable disease, and being composed of a mutual enlargement of the smaller arteries and veins. The disease originates from some accidental cause; is marked by a perpetual throbbing; grows slowly, but incontrollably; and is rather irritated, than checked, by compression. The throbbing is at first indistinct, but when the tumour is perfectly formed, the pulsation is very manifest. Every exertion makes the throbbing more evident. The occasional turgid states of the tumor produce sacs of blood in the cellular sub-

stance, or dilated veins, and these sacs form little tender, livid, very thin, points, which burst, from time to time, and then, like other aneurisms, this one bleeds so profusely, as to induce extreme weakness.

The tumor is a congeries of active vessels, and the cellular substance, through which these vessels are expanded, resembles, as Mr. John Bell describes, the gills of a turkey cock, or the substance of the placenta, spleen, or womb. The irritated and incessant action of the arteries fills the cells with blood, and from these cells, it is reabsorbed by the veins. The size of the swelling is increased by exercise, drinking, emotions of the mind, and by all causes which accelerate the circulation.

The hemorrhage from the aneurism by anastomosis sometimes usurps, in the female subject, the place of menstruation, as the following example illustrates.

Ann Vachot, of St. Maury, in Bresse, was born with a tumour on her chin, of the size and shape of a small strawberry, without pain, heat, or discolouration of the skin. As it produced no uneasiness, nor inconvenience whatever, it excited little attention, particularly as it did not seem to increase with the growth of the child. For the first fifteen years, there was but little alteration; but, about the menstrual period, it increased suddenly to double the size, and became more elongated in its form. A quantity of red blood was observed to ooze from its extremity. This flux became, in some measure, periodical, and sometimes was sufficiently abundant to produce an alarming degree of weakness. Each period of its return was preceded by a violent pain in the head and numbness.

Before and after the appearance of these symptoms, there was no alteration in the size of the tumour; the only difference was a small enlargement of the cutaneous veins, with an increase of heat in the part, occasioning some degree of tenderness.

The menses at length took place, but, in small quantity, and, at irregular periods, without influencing the blood discharged from the tumour, or the frequency of the evacuation.

The breasts were not enlarged till a late period, nor did the approach of puberty seem to have its accustomed influence on those glands, &c. (See *Parisian Chirurgical Journal, Vol.* 2, *p.* 73, 74.)

"This aneurism, (observes Mr. John Bell,) is a mere congeries of active vessels, which will not be cured by opening it; all attempts to obliterate the disease with caustics, after a simple incision, have proved unsuccessful, nor does the interrupting of particular vessels, which lead to it, affect the tumour; the whole group of vessels must be extirpated. In varicose veins, or in aneurisms of individual arteries, or in extravasations of blood, such as that produced under the scalp from blows upon the temporal artery, or in those aneurisms, produced in schoolboys by pulling the hair, and, also, in those bloody effusions from blows on the head, which have a distinct pulsation, the process of cutting up the varix, aneurism, or extravasation, enables you to obliterate the vessel and perform an easy cure. But, in this enlargement of innumerable small vessels, in this aneurism by anastomosis, the rule is 'not to cut into, but to cut it out.' These purple and ill-looking tumours, because they are large, beating, painful, covered with scabs, and bleeding, like a cancer in the last stage of ulceration, have been but too often pronounced cancers! incurable bleeding cancers! and the remarks, which I have made, while they tend, in some measure, to explain the nature and consequences of the disease, will remind you of various unhappy cases, where either partial incisions only had been practised, or the patient left entirely to his fate." (See *John Bell's Principles of Surgery, Vol.* 1.)

In the section on carotid aneurisms, I have mentioned the case, in which Mr. Travers cured an aneurism by anastomosis in the orbit, by tying the common carotid artery.

For information on aneurism, consult *Lauth's Scriptores Latini de Aneurismatibus, which work contains Asman's Dissertatio Medica Inauguralis de Aneurismate; Guattani, de Externis Aneurysmatibus; Lancisi de Aneurysmatibus. Opus Posthumum; Matani de Aneurysmaticis Præcordiorum Morbis Animadversiones; Verbrugge, Dissertatio Anatomico Chirurgica de Aneurysmate; Wetinus Dissertatio Inauguralis Medica de Aneurysmate Vero Pectoris Externo Hemiplegiæ Sobole; Murray, Observationes in Aneurismata Femoris; Trew, Aneurysmatis Spurii Post Venæ Basilicæ Sectionem Orti, Historia et Curatio. See also an account of Mr. Hunter's Method of performing the Operation for the Cure of the Popliteal Aneurism, by E. Home, in the Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge, Vol.* 1, *p.* 138, *and Vol.* 2, *p.* 235. *Sabatier's Médecine Opératoire, Tom.* 3. *Medico-Chirurgical Transactions, Vol.* 1 *and* 2. *Cases in Surgery by J. Warner, p.* 141, *&c. Edit.* 4. *Richerand's Nosographie Chirurgicale, Tom.* 4. *Pelletan's Clinique Chirurgicale, Tom.* 1 *and* 2. *A. Burn's Surgical Anatomy of the Head and Neck. Ramsden's Practical Observations on the Sclerocele, with four cases of operations for aneurism. Œuvres Chirurgicales de Desault par Bichat, Tom.* 2, *p.* 553. *Wells in Transact. of a Society for the Improvement of Med. and Chirurg. Knowledge, Vol.* 3, *p.* 81—85, *&c. Corvisart, Essai sur les Maladies et les Lesions Organiques du Cœur et des Gros Vaisseaux. Edit.* 2. *C. Bell's Operative*

Surgery, Vol. 1. *John Bell's Principles of Surgery, Vol.* 1. *Richter's Anfangsgrunde der Wundarzneykunst, Band* 1. *Abernethy's Surgical Works. Monro's Observ. in the Edinb. Med. Essays. Various productions in the Med. Observ. and Inquiries. The article Aneurism in Rees's Cyclopædia. Freer's Observations on Aneurism*, 1807; *and a Treatise on the Anatomy. Pathology, and Surgical Treatment of Aneurism by A. Scarpa, translated by J. H. Wishart*, 1808. *The original Italian was published* 1804.

ANODYNES, (from *α* neg. and *ὠδυνη*, pain.) Medicines are so termed, which diminish, or remove, pain, and they are indicated in surgery in all cases, in which it is desirable to relieve any intense pain. Opium is the principal one deserving confidence.

ANTHRACOSIS, (from *ανθραξ*, a burning coal.) A red, livid, burning, sloughy, very painful tumour, occurring on the eyelids. At first, antiphlogistic means are proper; but the grand thing is to make a free and early opening for the discharge of the matter contained in the swelling. The eye-lids and eye should be bathed with a collyrium, and kept cool with the saturnine lotion.

ANTHRAX, (*ανθραξ*, a burning coal.) See *Carbuncle.*

ANTIMONIUM CALCINATUM,—or PULVIS ANTIMONIALIS. (Supposed to be very similar to James's Powder.) Is now called the antimonial powder. In all cases of surgery, in which it is desirable to promote the secretions in general, and those of urine, perspiration, and of the alimentary canal, in particular, it is proper to have recourse to this important preparation. In all inflammations of the brain and its membranes, and, in every instance, in which there exists an inflammation of a viscus of high importance in the system, antimony should be exhibited, and, in general, the antimonial powder is as eligible a prescription as any. For an adult, four or five grains may be ordered, and the dose, if requisite, may be repeated, two or three times a day.

ANTIMONIUM MURIATUM. This has often been named, *butter of antimony*, and is employed in surgery as a caustic.

ANTIMONIUM TARTARIZATUM, (*Emetic Tartar.*) This medicine is well known as the most common emetic. For this purpose, it may be given in either of the following ways, as the indications of the case may demand. ℞. Antimonii Tart. gr. ij. Aq. distil. ℥iv. Misce et cola. Dosis ℥ij. pro emetico; vel ℥ss quadrante quoque horæ, donec supervenerit vomitus.

If tartarised antimony be exhibited merely to excite a diaphorœsis, half an ounce, or one table spoonful, of the above mixture is to be given once every six hours.

This preparation is very much employed by the best continental surgeons, for increasing the gastric secretions, and maintaining, for a length of time, a lax state of the bowels. We shall have occasion to notice its efficacy in the cure of numerous surgical diseases, particularly *Amaurosis, Erysipelas, Injuries of the Head, &c.*

ANTIPHLOGISTICS, (from *αντι*, against, and *φλογω*, to burn.) All means are so termed, which have a tendency to subdue inflammation. (See *Inflammation.*)

The first of these, to which the surgeon should direct his attention, when he wishes to cure an inflammatory affection, is to remove as far as it is in his power, the occasional cause. Extraneous bodies, lodged in parts, susceptible of this kind of irritation, and which substances produce inflammation by their mechanical operation, should be extracted as soon as possible, if their particular situation, shape, &c. will admit of it. The removal of substances, which irritate by their chemical properties, is difficult, and sometimes impracticable.

On account of their great activity, however, it is necessary to oppose their effects, without loss of time. This is accomplished, in a certain degree, by diluting such substances with aqueous fluids, defending the parts from their action by oily and sedative applications; and, by correcting the specific irritation of the substances applied, by means of other substances, which have a particular affinity with them.

Antiphlogistic remedies, properly so called, are divided into *general* ones, by which are meant such as affect the whole system; and into *topical* ones, the operation of which is, at least, for a certain time, entirely local and circumscribed.

General antiphlogistics are: 1. Bleeding. (See this word.)

2. Glysters, and gentle laxative medicines. The most active cathartics may sometimes be considered in the same light; but, there are many inflammations, in which the effect of strong purgatives is hurtful and dangerous. Such are, in particular, all instances, in which there is inflammation of the thoracic, and abdominal viscera.

3. Aqueous diluting beverages, taken in large quantities.

4. The warm bath.

5. Cooling medicines, such as acid drinks, saline draughts, and some of the neutral salts, such as nitre, the ammonia muriata, aq. ammon. acet. &c.

6. Anodynes, especially opium, only to be given, however, under the circumstances, and in the way, to be noticed in the article, *Inflammation.*

With these direct means of diminishing the action of the sanguiferous system, we must combine a more, or less complete abstinence from all solid animal food. Too warm an atmosphere should also be avoid-

ed, as well as all stimulants whatever, every kind of noise, every thing likely to alarm, or disturb the mind, &c.

Topical antiphlogistics are: 1. Local bleeding practised by means of leeches, scarifications, or cupping.

2. Emollient poultices, which are proper, when the inflammation is accompanied with an extraordinary degree of pain and hardness, and, especially, when it is disposed to suppurate. The best emollient poultice is that of linseed, described in the article *Inflammation*. Some use the one made of bread and milk; some disliking milk, in consequence of its inutility, and its tendency to turn sour, only use water: while others make the bread into a poultice by softening it, and beating it up, with Goulard's lotion.

3. Discutients are particularly used in all cases, in which the inflammation is less acute, and seems to have no tendency to suppurate. Cold water, various preparations containing lead, a solution of sal ammoniac in vinegar and water, spirit of wine, vinegar, æther, the various infusions of bitter aromatic plants, and the decoction of bark, are very good discutient remedies.

4. The maintenance of a continual evaporation from the surface of the inflamed part, by applying folded linen, wet with the lotio aq. litharg. acet. cold water, a solution of zincum vitriolatum, &c. Spirits, æther, snow, or powdered ice, produce more cold, and, are sometimes, though not very commonly, made use of. This is the ordinary principle, on which surgeons conduct the local treatment of phlegmonous inflammation, when there is the prospect of avoiding the formation of an abscess.

5. Fomentations. These are prepared by dipping flannels in some warm liquor, squeezing a certain quantity of fluid out of them, and then placing them quite warm on the inflamed part. They are mostly used in cases, in which emollient poultices are the permanent local applications, and when the patient suffers extraordinary pain. A decoction of white poppy heads, or camomile flowers, is the liquor commonly employed. Fomentations are very temporary means, being only applied in general, about half an hour, two, or three times a day. The best opportunity of doing this, is when the poultice is to be changed.

6. Among the means, essential to an antiphlogistic regimen, perfect quietude, both of body and mind, is not the least important. (See *Inflammation.*) *Encyclopédie Méthodique; Partie Chirurgicale.*

ANTISEPTICS, (from αντι, against, and σηπω, to purify.) This name is given to such remedies, as are supposed to have the virtue of resisting the tendency to putrefaction in the human body, or to arrest its progress, after it has commenced. According to these ideas, they are indicated in cases of mortification, and sloughing ulcers.

The greatest part of antiphlogistic remedies are also antiseptic, as we shall see the reason of in the article *Mortification*. The most renowned antiseptic remedies of the internal kind, are vegetable, and mineral acids, fluids impregnated with carbonic acid gas, wine, aromatics, camphor, bitters in general, and, particularly, bark. The chief external antiseptic applications are preparations of lead, cold water, snow, ice, spirits, turpentine, or aromatics, such as camomile flowers, rue, &c. It has also been recommended to apply the carbonic acid gas itself. This may be done, either by directing the air against the parts affected through a funnel, as soon as the gas is extricated from the substances, which contain it; or by applying to the parts affected poultices, composed of such ingredients, as will ferment, and form a large quantity of the gas. (See *l'Encyclopédie Méthodique; Partie Chirurgicale.*)

ANTRUM MAXILLARE. This is a considerable cavity, situated in the upper jaw bone. It is also named the *Sinus Maxillaris*, or *Antrum Highmorianum*, from the name of an anatomist, who gave the first accurate description of it.

The antra are liable to several morbid affections. Sometimes, their membranous lining inflames, and secretes pus. At other times, in consequence of inflammation, or other causes, various excrescences and fungi are produced in them. Their bony parietes are occasionally affected with exostosis, or caries. Extraneous bodies may be lodged in them, and, it is even asserted, that insects may be generated in them, and cause, for many years, very afflicting pains.

ABSCESSES IN THE ANTRUM.

Of all the above cases, this is far the most common. Violent blows on the cheeks, inflammatory affections of the adjacent parts, and, especially, of the pituitary membrane lining the nostrils, exposure to cold and damp, and, above all things, bad teeth, may induce inflammation and suppuration in the antrum. The first symptom is a pain, at first imagined to be a tooth-ach, particularly if there should be a carious tooth, at this part of the jaw. This pain, however, extends more into the nose, than that usually does, which arises from a decayed tooth; it also affects, more or less, the eye, the orbit, and the situation of the frontal sinuses. But, even such symptoms are insufficient to characterize the disease, the nature of which is not unequivocally evinced, till a much later

period. The complaint is, in general, of much longer duration, than one entirely dependent on a caries of a tooth, and its violence increases more and more, until, at last, a hard tumour becomes perceptible below the cheek bone. The swelling, by degrees, extends over the whole cheek: but, it afterwards rises to a point, and forms a very circumscribed hardness, which may be felt above the back grinders. This symptom is accompanied by redness, and sometimes by inflammation and suppuration of the external parts. It is not uncommon, also, for the outward abscess to communicate with that within the antrum.

The circumscribed elevation of the tumour, however, does not occur in all cases. There are instances in which the matter makes its way towards the palate, causing the bones of this part to swell, and, at length, rendering them carious, unless timely assistance be given. There are other cases, in which the matter escapes between the fangs and sockets of the teeth. Lastly, there are other examples, in which matter, formed in the antrum, makes its exit at the nostril of the same side, when the patient is lying with his head on the opposite one, in a low position. If this mode of evacuation should be frequently repeated, it prevents the tumour, both from pointing externally, and bursting, as it would do if the purulent matter could find no other vent. But this evacuation of pus from the nostril is not very common; for, according to Mr. Hunter, the opening between the antrum and cavity of the nose, is generally stopped up. This celebrated anatomist even seems inclined to think, that the disease may sometimes be occasioned by the impervious state of this opening, in consequence of which obstruction, the natural mucus of the antrum may collect there in such quantity, as to irritate and inflame the membrane, with which it is in contact. This may happen in the same way as an obstruction in the ductus nasalis hinders the passage of the tears into the nose, and causes an abscess in the lachrymal sac. (See *Natural History of the Human Teeth, &c. by John Hunter, p.* 174.) However, in the majority of cases, we may conclude, that the impervious state of the opening is rather an effect, than the cause, of the disease, since inflammation in the antrum is often manifestly produced by causes of a different kind, and since the opening in question is not invariably closed.

Abscesses in the antrum require a free exit for their contents, and, if the surgeon neglects to procure such opening, the bones become more and more distended and pushed out, and, finally, carious. When this happens, the pus makes its appearance, either towards the orbit, the alveoli, the palate, or, as is mostly the case, towards the cheek. The matter having thus made a way for its escape, the disease now becomes fistulous.

In all cases the principal indication is to discharge the matter, whether the pus is simply confined in the antrum, or whether the case be conjoined with a carious affection of the bones.

The ancients seem to have known very little of the treatment of diseases of the antrum. Drake, an English anatomist, is reputed to be the first proposer of a plan for curing abscesses of this cavity. Meibomius, however, had, a long while before him, proposed, with the same intention, to extract one or more of the teeth, in order that the matter might find an opening for its escape, through the sockets. This plan may be employed with success. The pus frequently has a tendency to make its way outward towards the teeth; it often affects their fangs; and, after their extraction, the whole of the abscess is seen to escape through the sockets. But this very simple plan will not suffice for all cases, as there are numerous instances, in which there is no communication between the alveoli and the antrum.

Drake, and, perhaps, before him, Cowper, took notice of the insufficiency of Meibomius's method, and, hence, they proposed making a perforation through the socket into the antrum with an awl, for the purpose of letting out the matter, and injecting into the cavity such fluids as were judged proper.

The extraction of one or more teeth, and the perforation of the alveoli, being essential steps in treating diseases of the antrum, we must consider what tooth ought to be taken out in perference to others.

A caries, or even a mere continual aching, of any particular tooth, in general ought to decide the choice. But, if all the teeth should be sound, which is not often the case, writers direct us to tap each of them gently, and to extract the one, which gives most pain on this being done. When no information can be thus obtained, other circumstances ought to guide us.

All the grinding teeth, except the first, correspond with the antrum. They even sometimes extend into this cavity, and the fangs are only covered by the pituitary membrane. The bony lamella, which separates the antrum from the alveoli, is attenuated, towards the back part of the upper jaw. Hence, it is best, when the choice is in our power, to extract the third or fourth grinder, as, in this situation, the alveoli can be more easily perforated. Though, in general, the first grinder and canine tooth do not communicate with the antrum, yet, their fangs occasionally approach the side of this cavity.

When one or more teeth are carious, they should be removed, because they are both useless and hurtful. The matter frequently makes its escape, as soon as a tooth is extracted, in consequence of the fang having extended into the antrum, or rather in consequence of its bringing away with it a piece of the thin partition between it and the sinus. Perhaps a discharge may follow from the partition itself being carious. If the opening, thus produced, be sufficiently large to allow the matter to escape, the operation is already completed. But, as it can easily be enlarged, it ought always to be so when there is the least suspicion of its being too small. However, when no pus makes its appearance, after a tooth is extracted, the antrum must be opened by introducing a pointed instrument in the direction of the alveoli. Some use a small trocar, or awl; others a gimblet for this purpose.

The patient should sit on the ground, in a strong light, resting his head on the surgeon's knee, who is to sit behind him. Immediately the instrument has reached the cavity, it is to be withdrawn. Its entrance into the antrum is easily known by the cessation of resistance. After the matter is discharged, surgeons advise the opening to be stopped up with a wooden stopper, to keep victuals from getting into the antrum.

The stopper is to be taken out, several times a day, to allow the pus to escape. This plan soon disposes the parts affected to discontinue the suppuration, and resume their natural state. Sometimes, however, the pus continues to be discharged, for a long time after the operation, without any change occurring, in regard to its quality or quantity. In such instances the cure may often be accelerated by employing injections of brandy and water, lime-water, or a solution of zincum vitriolatum.

Some surgeons prefer a silver cannula instead of the stopper, as it can always be left pervious except at meals.

If no opening were made in the antrum, the matter would make its way, sometimes towards the front of this cavity, which is very thin; sometimes, towards the mouth, and fistulous openings, and caries would inevitably follow.

When the bones are carious, the above plan will not accomplish a cure, until the affected pieces of bone exfoliate. A probe will generally enable us to detect any caries in the antrum. The fetid smell, and ichorous appearance of the discharge, also, leave little doubt that the bones are diseased; and, in proportion as the bones free themselves of any dead portions, the discharge has less smell, and its consistence becomes thicker.

There are cases, in which there are loose pieces of dead bone to be extracted, and, in which it is requisite to make a larger opening into the antrum, than can be obtained, at its lower part. Instances also occur, in which patients have lost all the grinding teeth, and the sockets are quite obliterated, so that a perforation from below could hardly be effected. Some practitioners have also objected to ever sacrificing a sound tooth. In these circumstances, it has been advised to make a perforation in the antrum, above the alveolary processes. M. Lamorier is the first who proposed this method. It consists in making a transverse incision, below the malar process, and above the root of the third grinder. Thus the gum and periosteum are divided, and the bone exposed. A perforating instrument is to be conveyed into the middle of this incision, and the opening in the antrum made as large as requisite. There are cases of very extensive exfoliations of the antrum, in which it is absolutely necessary to expose a great part of the surface of the bone, and to cut away the dead pieces which are wedged, as it were, in the living ones. A small trephine may sometimes be advantageously applied to the malar process of the superior maxillary bone.

Surgeons formerly treated carious affections of the antrum in the most absurd and unscientific way, introducing setons through its cavity, and even having recourse to the actual cautery. The moderns, however, are not much inclined to adopt this sort of practice. It is now known, that the detachment of a dead portion of bone, in other terms, the process of exfoliation, is nearly, if not entirely, the work of nature, in which the surgeon can at most only act a very inferior part. Indeed, he should limit his interference to preventing the lodgment of matter, maintaining strict cleanliness, and removing the dead pieces of bone, as soon as they become loose. But, it is to be understood, that there are occasional examples, in which the dead portions of bone are so tedious of separation, and so wedged in the substance of the surrounding living bone, that an attempt may be properly made to cut them away.

TUMOURS OF THE ANTRUM.

Ruysch, Bordenave, Desault, Abernethy, and many others, have recorded cases of polypous, fungous, and cancerous diseases of the antrum, and of the parietes of this cavity being affected with exostosis.

The indolence of any ordinary fleshy tumour in the antrum, while in an incipient state, certainly tends to conceal its existence; but, such a disease rarely occurs without being accompanied by some

affection of the neighbouring parts, and, hence, its presence may generally be ascertained before it has attained such a size as to have altered the conformation of the antrum. This information may be acquired by examining, whether any of the teeth have become loose, or have spontaneously fallen out; whether the aveolary processes are sound, and whether there are any fungous excrescences making their appearance at the sockets; whether there is any habitual bleeding from one side of the nose; any sarcomatous tumour at the side of the nostril, or towards the great angle of the eye. When the swelling has attained a certain size, the bony parietes of the antrum are always protruded outwards, unless the body of the tumour should be situated in the nostril, and only its root in the antrum. This case, however, is very uncommon.

As soon as a tumour is certainly known to exist in the antrum, the front part of this cavity should be opened, without waiting till the disease makes further progress. In a few instances, indeed, we may avail ourselves of the opening, which is sometimes found in the alveolary process, and enlarge it sufficiently to allow the tumour to be extirpated. If the front of the antrum were freely opened, it would in general be better to cut away the disease in its interior.

A swelling of the parietes of the antrum, in consequence of an abscess, or a sarcomatous tumour in its cavity, may lead us to suppose the case an enlargement of the bones, or an exostosis. The symptoms of the two first affections have been already detailed. A sign of an exostosis is, when besides the absence of the symptoms characterizing an abscess or a sarcoma, the thickened parietes of the antrum form a solid resistance; whereas, in cases of mere expansion, the dimensions of the surface of the bone being increased, while its substance is proportionally attenuated, the resistance is not so considerable.

When such an exostosis depends upon a particular constitutional cause, and, especially, upon one of a venereal nature, it must be attacked by remedies suited to this affection. But, when the disease resists internal remedies, and its magnitude is likely to produce an aggravation of the case, a portion of the bone may be removed with a trephine, or a cutting instrument. Such operations, however, require a great deal of delicacy and prudence.

Mr. B. Bell, vol. 4, describes a kind of exostosis of the upper jaw, very different from what we have mentioned, since instead of its being distinguishable fromother diseases of the antrum by the greater firmness of the tumour, the substance of the bone gradually acquires such suppleness and elasticity, that it yields to the pressure of the fingers, and immediately resumes its former plumpness, when the pressure is discontinued. If the bone be cut, it is found to be as soft as cartilage, and, in an advanced stage of the disease, its consistence is almost gelatinous. The swelling increases gradually, and extends equally over the whole cheek, without becoming prominent at any particular point, or only so in the latter periods of the malady, when the soft parts inflame and become affected. The complaint is described as totally incurable. Cutting and trephining the tumour, as recommended in other cases of exostosis, only exasperate the patient's unhappy condition.

Mr. Abernethy has related an account of a very singular disease of the antrum. The patient, who was 34 years of age when the account was written, perceived, when about ten years old, a small tumour on his left cheek, which gradually attained the size of a walnut, and then remained, for some time, stationary. About a year afterwards, the tumour having again enlarged, a caustic was applied to the integuments, so as to expose the bone. The actual cautery was next applied, and an opening thus made into the antrum. After the exfoliation the antrum became filled with a fungus, which rose out upon the cheek, and could not be restrained by any applications. Part of the fungus also made its way into the mouth, through the socket of the second tricuspid tooth, the other teeth remaining natural. The disease continued in this state nine years, occasionally bleeding in an alarming way. When the patient was in his 20th year, the whole fungus sloughed away during a fever, and has not returned. After this the sides of the aperture in the bone began to grow outwards, forming an exostosis, which has grown to a great magnitude. A small exostosis took place in the mouth, but became no larger than a horse bean. The exostosis of the maxillary bone is of an irregular figure, and projects from the whole circumference of the aperture a great way directly forward. Mr. Abernethy compares its appearance, when he was writing, with that of a large tea-cup fastened upon the face, the bottom of which may be supposed to communicate with the antrum. The diameter of the cup, formed by the circular edge of the bone was three inches and a half; the depth two inches and seven-eighths. The general height of the sides of the exostosis, from the basis of the face was two inches; its walls were not thick, and terminated in a thin circular edge. The integuments, as they approach this edge, become attenuated, and they extend over the edge into the cavity. The exostosis now reaches

to the nose in front, and to the masseter muscle behind; above it includes the very ridge of the orbit, and below it grows from the edge of the alveolary process. A line that would have separated the diseased from the sound bone, would have included the orbit and nose, and indeed, one half of the face. Mr. Abernethy saw no means of affording the man relief. (*Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge, Vol.* 2.)

In a case of fungus growing in the antrum, and which had distended the antrum, hindered the tears from passing down into the nose, raised the lower part of the orbit, caused a protrusion of the eye, made two of the grinding teeth fall out, and occasioned a carious opening in the front of the antrum, through which opening a piece of the fungus projected, Desault operated as follows: the cheek was first detached from the os maxillare, by dividing the internal membrane of the mouth, at the place where it is reflected over this bone. Thus, the outer surface of the bone was denuded of all the soft parts. A sharp, perforating instrument was applied to the middle of this surface, and an opening made more forward than the one already existing. The plate of bone, situated between the two apertures, was removed with a little falciform knife, which, being directed from behind forward, made the division without difficulty. The opening, thus obtained, being insufficient, Desault endeavoured to enlarge it below, by sacrificing the alveolary process. This he endeavoured to accomplish with the same instrument, but, finding the resistance too great, he had recourse to a gouge and mallet. A considerable piece of the alveolary arch was thus detached, without any previous extraction of the corresponding teeth, three of which were removed by the same stroke. In this manner an opening was procured in the external and inferior part of the antrum, large enough to admit a walnut. Through this aperture a considerable part of the tumour was cut away with a knife, curved sideways, and fixed in its handle. A most profuse hemorrhage took place; but, Desault, unalarmed, held a compress in the antrum for a short time; this being removed, the actual cautery was applied repeatedly to the rest of the fungus. The cavity was dressed with lint, dipped in powdered colophony.

On the eighteenth day the swelling was evidently diminished, the eye less prominent, and the epiphora less visible. But, at this period a portion of fungus made its appearance again. This was almost entirely destroyed by applying the actual cautery twice. It appeared again, however, on the 25th day, and required a third and last recourse to the cautery. From this time the progress of the cure went on rapidly. Instead of fungous excrescences, healthy granulations were now formed in the bottom of the sinus. The parietes of the antrum, gradually approaching each other, the large opening made in the operation was obliterated, and reduced to a small aperture, hardly large enough to admit a probe. Even this little opening was closed in the fourth month, at which time no vestiges of the disease remained, except the loss of teeth, and a very obvious depression just where they were situated.

In all fungous diseases of the antrum, making a free exposure of them is an essential part of the treatment: if you neglect this method, how can you inform yourself of the size, form, and extent, of the tumour? How could you remove the whole of the fungus, through a small opening, which would only allow you to see a very little portion of the excrescence? How could you be certain that the disease were extirpated, to its very root? Even when the antrum is freely opened, this circumstance can only be learnt with difficulty; and how could it be ascertained, when only a point of the cavity is opened? A portion, left behind, very soon gives origin to a fresh fungus, the progress of which is more rapid, and the character more fatal, in consequence of being irritated by the surgical measures adopted.—(*Œuvres Chirurgicales de Desault par Bichat, Tom.* 2.)

I imagine that English surgeons, unaccustomed to use the actual cautery, will peruse with a degree of aversion, this means so commonly employed in France by Desault, and other celebrated surgeons. Nor can I expect that they will altogether approve the use of the mallet and gouge, for making a free opening into the antrum. Perhaps, it might be better to trephine this cavity with a small instrument for the purpose, and then cut the fungus away. After removing as much of it as possible in this manner, some instrument of suitable shape might be used to scrape the part, where the tumour has its root. However, if there be any case in which potent and violent measures, like those of Desault, are allowable, it is the one, of which we have just been treating. Inveterate diseases demand powerful means, and tampering with them is generally more hurtful than useful.

There is an interesting case of a fungus in the maxillary sinus, related in the first volume of the Parisian Chirurgical Journal. It was at last cured by opening the antrum, applying the cautery, and tying the portion of the tumour, which had made its way into the nose. In the second volume of the same work, is an ex-

cellent case, exhibiting the dreadful ravages, which the disease may produce when left to itself.

INSECTS IN THE ANTRUM.

It is said, that insects in this cavity may sometimes make it necessary to open the part. This case, however, must be exceedingly rare, and even what we find in authors (*Pallas de insectis viventibus intra viventia*), appears so little authentic, that we should hardly have thought it necessary to make mention of the circumstance, if there were not, in a modern work (*Med. Comm. Vol.* 1.) a fact which appears entitled to implicit belief. Mr. Heysham, a medical practitioner at Carlisle, relates, that a strong woman, aged sixty, in the habit of taking a great deal of snuff, was subject, for several years, to acute pains in the antrum, extending over one side of the head. These pains never entirely ceased, but were more severe in winter than summer, and were always subject to frequent periodical exasperations. The patient had taken several anodyne medicines, and others, without benefit, and had twice undergone a course of mercury, by which her complaints had been increased. All her teeth on the affected side had been drawn. At length it was determined to open the antrum with a large trocar, though there were no symptoms of an abscess, nor of any other disease in this cavity. For four days no benefit resulted from this operation. During this space, bark injections, and the elixir of aloes, were introduced into the sinus. On the fifth day a dead insect was extracted, by means of a pair of forceps, from the mouth of the cavity. It was more than an inch long, and thicker than a common quill. The patient now experienced relief for several hours: but, the pains afterwards recurred with as much severity as before; oil was next injected into the antrum, and two other insects, similar to the former, were extracted. No others appeared, and the wound closed. The pains were not completely removed, but they were considerably diminished for several months, at the end of which time they became worse than ever, particularly affecting the situation of the frontal sinus.

M. Bordenave has published, in the twelfth and thirteenth volumes of the Mem. de l'Acad. de Chir. Edit. 12mo. two excellent papers on the diseases of the antrum. In the thirteenth volume, he relates the history of a case, in which several small whitish worms, together with a piece of fetid fungus, were discharged from the antrum, after an opening had been made on account of an abscess of the antrum, attended with caries. (*P.* 381.) But, in this instance, the worms had probably been generated after the opening had been made in the cavity; for, when they made their appearance, the opening had existed nine months.—(See on this subject *Precis d' Observations sur les Maladies du Sinus Maxillaire Par M. Bordenave, in Mem. de l'Acad. Royale de Chirurgie, Tom.* 12, *Edit. in* 12mo. *Also Suite d'Observations on the same Subject, by M. Bordenave, Tom.* 13. *of the said Work. L'Encyclopédie Méthodique, Partie Chirurgicale, art. Antre Maxillaire. Remarques et Observations sur les Maladies du Sinus Maxillaire, in Œuvres Chirurgicales de Desault par Bichat, Tom.* 2, *p.* 156. *Desault's Parisian Chirurgical Journal, Vol.* 1 *and* 2. *Medical Communications, Vol.* 1. *Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge, Vol.* 2. *Natural History of the Human Teeth, by John Hunter, p.* 174, 175, *Edit.* 3. *Gooch's Chirurgical Works, Vol.* 2, *p.* 61, *and Vol.* 3, *p.* 161, *Edit.* 1792.)

ANUS. The lower termination of the great intestine, named the rectum, is so called, and its office is to form an outlet for the feces.

The anus is furnished with muscles, which are peculiar to it, viz. the sphincter, which keeps it habitually closed, and the *levatores ani*, which serve to draw it up into its natural situation, after the expulsion of the feces. It is also surrounded, as well as the whole of the neighbouring intestine, with muscular fibres, and a very loose sort of cellular substance.

The anus is subject to various diseases, in which the aid of surgery is requisite: of these we shall next treat.

IMPERFORATE ANUS.

This complaint is sometimes met with, though not very often. As it is of the utmost consequence that such mal-formations should not remain long unknown, one of the earliest duties of an accoucheur, after delivery, should be the examination of all the natural outlets of the new-born infant.

Such an inspection sometimes evinces, that the place in which the extremity of the rectum, or the anus, ought to be, is entirely, or partly, shut up by a membrane, or fleshy adhesion. In other instances, no vestige of the intestine can be found, as the skin retains its natural colour over the whole space, between the parts of generation and the os coccygis, without being more elevated in one place than another. In such cases the intestine sometimes terminates in one or two culs-de-sac, about an inch upward from the ordinary situation of the anus. Sometimes it does not descend lower than the upper part of the sacrum; sometimes it opens into the bladder, or vagina.

When a surgeon is consulted for such cases, he must not lose much time in de-

liberation; for, if a speedy opening be not made for the feces, the infant will certainly very soon perish, with symptoms similar to those of a strangulated hernia. After ascertaining the complaint, which is an easy matter, we should endeavour to learn, whether the anus is merely shut by a membrane, or fleshy adhesion: or whether the anus is altogether wanting, in consequence of the lower portion of the cavity of the gut being obliterated, or the rectum not extending sufficiently far down.

When a membrane, or a production of the skin closes the opening of the rectum, the part producing the obstruction, is somewhat different in colour from the neighbouring integuments. It is usually of a purple or livid hue, in consequence of the accumulations of the meconium on its inner surface. The meconium, propelled downward by the viscera above, forms a small, roundish prominence, which yields like dough to the pressure of the fingers; but, immediately projects as before, when the pressure is removed. When a fleshy adhesion closes the intestine, the circumstance is obvious to the eye, if the part protrude, which is generally the case. The finger feels greater hardness and resistance, than when there is a mere membrane, and the livid colour of the meconium cannot be seen through the obstructing substance.

These last signs alone are enough to convince the surgeon of the necessity of the operation; but, they do not clearly shew, whether the intestine descends, as far as it ought, in order to form a proper kind of anus. Complete information on this point can only be acquired, after the membrane, or adhesion, has been divided; or else after the child's death, when the operation has proved ineffectual. Though there be no mark to denote, where the anus ought to be situated, and no degree of prominence, yielding, like soft dough, to the pressure of the fingers, and rising again, when such pressure is removed; yet, it may happen, especially on our being consulted immediately after the child is born, that, notwithstanding the absence of such symptoms, denoting the presence of the meconium, and the natural extent of the intestine, as far as where the anus ought to be, the gut may exist, and have a cavity, as far as the membrane, or adhesion, closing it.

When the anus is only covered with skin, and its place pointed out by a prominence, arising from the contents of the rectum, we have only to make an opening with a knife, sufficient to let out the meconium. Levret recommends making a circular incision in the membrane; but, a transverse cut is sufficient. A small tent of lint is afterwards to be introduced, in order to keep the opening from closing. If the anus should only be partly closed by a membrane, the opening may be dilated with a tent; but, if the aperture should be very small, it is preferable to use the bistoury for its enlargement.

When no external appearance denotes where the situation of the anus ought to be, the case is much more serious and embarrassing; and this, whether the intestine is stopped up by a fleshy adhesion, or the coalescence of its sides, or whether a part of the gut is wanting.

However, it is the surgeon's duty to do every thing in his power to afford relief. For this purpose, an incision, an inch long, is to be made in the situation where the anus ought to be, and the wound is to be carried more and more deeply in the natural direction of the rectum. The cuts are not to be made directly upwards, nor in the axis of the pelvis, for the vagina, or bladder, might thus be wounded. On the contrary, the operator should cut backward, along the concavity of the os coccygis, where there is no danger of wounding any part of importance. In all cases of this kind, the surgeon's finger is the best director. The operator, guided by the index finger of his left hand, introduced within the os coccygis, is to dissect in the direction above recommended, until he reaches the feces, or has cut as far as he can reach with his finger. If he should fail in finding the meconium, as death must unavoidably follow, one more attempt ought to be made, by introducing, upon the finger, a long trocar, in such a direction as seems best calculated for finding the rectum.

By the prudent adoption of such proceedings, many infants have been preserved, which otherwise would have been devoted to certain death. Hildanus, La Motte, Roonhuysen, and many others, have successfully adopted the above practice. Mr. B. Bell informs us, he has seen two of these cases, in which the intestine was very distant from the integuments, and in which he was so successful, as to form an anus, which fulfilled its office tolerably well for several years; but, he found it exceeding difficult to keep the passage sufficiently large and pervious. As soon as he removed the dossils of lint, and other kinds of tents, used for maintaining the necessary dilatation, such a degree of contraction speedily followed, that the evacuation of the intestinal matter became very difficult, for a long while afterwards. He employed, at different times, tents made of sponge, gentian root, and other substances, which swell on being moistened. But these always produced so much pain and irritation, that it was impossible to persevere in their use. After remarking such inconveniences, he

recommends, in opposition to the advice of other authors, not to make use of such tents in these cases. He is of opinion, that whoever makes trial of them upon parts, as sensible as the rectum, will soon find, that the advice of the writers alluded to is ill-founded.

Tents, made of very soft lint, dipped in oil, or rolls of bougie plaster, cause less irritation, than those composed of any other materials.

Though keeping the opening dilated may seem simple and easy, to such men as have had no opportunities of seeing cases of this description, it is far otherwise in practice. Mr. Bell assures us, that he never met with any disease, which gave him so much trouble and embarrassment, as he experienced in the two cases of this sort, which occurred in his practice. Although in both instances he at first made the openings sufficiently large, it was only by very assiduous attention, for eight or ten months, that the necessity for another operation, and even repeated ones, was prevented. When only the skin has been divided, the rest of the treatment is doubtless more simple; for, then, nothing more is requisite, than keeping a piece of lint, for a few days, in the opening made with the knife. But, when the extremity of the rectum is at a certain distance, though we may generally hope to effect a cure, after having succeeded in giving vent to the intestinal matter; yet, the treatment, after the operation, will always demand a great deal of attention and care on the part of the surgeon, for a long while. The difficulty of success may be considered as, in some measure, proportioned to the depth of the necessary incision.

Sometimes, while the anus appears pervious and well-formed, infants suffer the same symptoms, as if there were no anus at all. The reason of this depends upon the intestine being occasionally closed by a membranous partition, situated more or less upward, above the aperture of the anus, and, sometimes the symptoms are owing to the termination of the gut in a cul-de-sac. This erroneous formation may always be suspected, whenever an infant, whose anus is externally open, does not void any excrement, for two or three days after its birth, and, especially, when urgent symptoms arise, such as swelling of the belly, vomiting, &c. We are now to endeavour to ascertain, whether the rectum is impervious above the anus, by attempting to inject glysters, or to introduce a probe. If the gut be shut up, there is nothing to be done, but having recourse to the method described above, and forming a communication by means of a bistoury guided on the finger, or else with a pharyngotomus. If the obstacle should only consist of a transverse membrane, the operation will be easy, and its success almost certain. But, if there should be a strangulation, or obstruction of the intestine, the case is infinitely more serious. However, as the operation is the only resource for saving the child's life, we ought not to hesitate about performing it.

When the anus is imperforate, the intestine sometimes opens into the vagina, or bladder. The first of these cases is the least dangerous of all the malformations of this sort. The intestine may also open, and terminate at two places, at the same time, viz. at the usual place, so as to form a proper anus, more or less perfect; and also in the vagina.

If these two openings should be ample enough for the easy evacuation of the excrement, nothing can be done at so tender an age; for, though voiding the feces through the vagina, is a most unpleasant inconvenience, yet, there is no effectual means of closing the opening of the intestine in this situation, nor could one be devised, which would not seriously incommode the infant.

But, when the two openings are exceedingly small, and the alvine evacuations cannot readily pass out, even with the aid of glysters, the opening of the anus ought to be dilated by cannulæ of different sizes. If this method should not avail, the knife must be employed, and the wound dressed, as already explained.

For the most part, the intestine has only one opening in the vagina. In this circumstance, as in the instance in which the feces have no vent at all, we must make an incision in that place, which the anus ought to occupy. The natural course of the feces being opened by this operation, which in such a case is not at all perilous, much less excrement will pass out of the vagina, and, of course, the infirmity will be diminished. By the introduction of a tube into the new anus, the communication between the rectum and vagina, might possibly be obliterated, and a perfect cure accomplished. The opening between the intestine and vagina, may, also, be too small for the easy evacuation of the feces, and this might even expose the infant to the same sort of dangerous symptoms, as it would be subject to, if the rectum had positively no opening at all.

In male infants, the rectum sometimes opens into the bladder, and, in this circumstance, there is generally no anus. The case is easily known by the meconium being blended with the urine, which acquires a thick greenish appearance, and is voided almost continually, though in small quantities. The most fluid part of the meconium, is the only one voided in this manner. The thicker part not get-

ting from the rectum into the bladder, nor from the bladder into the urethra, greatly distends the intestines and bladder, and produces the same symptoms, as take place, in cases of total imperforation. Hence, without the speedy interference of art to form an anus, capable of giving vent to the feces, with which the urinary organs cannot remain obstructed, the infant will inevitably die. This case must, therefore, be treated like the foregoing ones. Though we can hardly hope to completely prevent the inconveniences, resulting from the rectum opening into the bladder, since even a new passage will not completely hinder the feces from following the other course; yet, we shall thus afford the child a very good chance of preservation, and the only one which its situation will allow.

In cases, in which we cannot procure an outlet for the feces, by any of the methods pointed out above, it has been proposed to make an opening into the abdomen above the pubes, or on the right side, in order to get at the colon, and form an artificial anus, in one of these situations. But the prospect of success would be so small, that the plan is not likely to be much adopted. (See *De la Médecine Opératoire par Sabatier, Tom.* 1. *Also Remarques sur Différens Vices de Conformation, que les Enfans apportent en naissant Par M. Petit, in Mem. de l' Acad. Royale de Chirurgie, Tom.* 2, *p.* 236, *Edit. in* 12*mo. Richerand's Nosographie Chirurgicale, Tom.* 3, *p.* 415, *&c. Edit.* 2.)

ABSCESSES OF THE ANUS.—FISTULA IN ANO.

The custom of giving the appellation of *fistula* to every collection of matter formed near to the anus, has, by conveying a false notion of them, been productive of such methods of treating them, as are diametrically opposite to those which ought to be pursued.

A small orifice or outlet from a large or deep cavity, discharging a thin gleet, or sanies, made a considerable part of the idea, which our ancestors had of a fistulous sore, wherever seated. With the term fistulous, they always connected a notion of callosity: and, therefore, whenever they found such a kind of opening yielding such sort of discharge, and attended with any degree of induration, they called the complaint a *fistula*. Imagining this callosity to be a diseased alteration made in the very structure of the parts, they had no conception that it could be cured by any means, but by removal with a cutting instrument, or by destruction with escharotics: and, therefore, they immediately attacked it with knife or caustic, in order to accomplish one of these ends: and very terrible work they often made.

That abscesses, formed near the fundament, do sometimes, from bad habits, from extreme neglect, or from gross mistreatment, become fistulous, is certain; but the majority of them have not, at first, any one character or mark of a true fistula; nor can, without the most supine neglect on the side of the patient, or the most ignorant mismanagement on the part of the surgeon, degenerate, or be converted into one.

Collections of matter from inflammation (wherever formed) if they be not opened in time, and in a proper manner, do often burst. The hole, through which the matter finds vent, is generally small, and not often situated in the most convenient, or most dependent part of the tumour: it therefore is unfit for the discharge of all the contents of the abscess; and, instead of closing, contracts itself to a smaller size, and becoming hard at its edges, continues to drain off what is furnished by the undigested sides of the cavity.

When an abscess about the anus bursts, the smallness of the accidental orifice; the hardness of its edges; its being found to be the outlet from a deep cavity; the daily discharge of a thin, gleety, discoloured kind of matter; and the induration of the parts round about, have all contributed to raise, and confirm the idea of a true fistula.

Upon this idea was built the old pernicious doctrine of free excision, or as free destruction.

Abscesses about the anus present themselves in different forms.

Sometimes the attack is made with symptoms of high inflammation; with pain, fever, rigor, &c. and the fever ends as soon as the abscess is formed.

In this case, a part of the buttock near to the anus is considerably swollen, and has a large circumscribed hardness. In a short time, the middle of this hardness becomes red, and inflamed; and in the center of it matter is formed.

This (in the language of our ancestors) is called in general a *phlegmon*; but when it appears in this particular part, a *phyma*.

The pain is sometimes great, the fever high, the tumour large, and exquisitely tender; but however disagreeable the appearances may have been, or however high the symptoms may have risen, before suppuration, yet, when that end is fairly and fully accomplished, the patient generally becomes easy and cool; and the matter formed under such circumstances, though it may be plentiful, yet is good.

On the other hand, the external parts, after much pain, attended with fever, sickness, &c. are sometimes attacked with considerable inflammation, but without any of that circumscribed hardness, which characterised the preceding tumour; instead of which, the inflammation is extended largely and the skin wears an erysipelatous kind of an appearance. In this, the disease is more superficial; the quantity of matter small, and the cellular membrane sloughy to a considerable extent.

Sometimes, instead of either of the preceding appearances, there is formed in this part, what the French call *une suppuration gangreneuse*; in which the cellular and adipose membrane is affected in the same manner, as it is in the disease called a carbuncle.

In this case the skin is of a dusky red or purple kind of colour; and although harder than when in a natural state, yet it has, by no means, that degree of tension or resistance, which it has either in the phlegmon, or in the erysipelas.

The patient has generally, at first, a hard, full, jarring pulse, with great thirst, and very fatiguing restlessness. If the progress of the disease be not stopped, or the patient relieved by medicine, the pulse soon changes into an unequal, low, faultering one; and the strength and the spirits sink in such manner, as to imply great and immediately-impending mischief. The matter formed under the skin, so altered, is small in quantity, and bad in quality; and the adipose membrane is gangrenous and sloughy throughout the extent of the discolouration. This generally happens to persons, whose habit is either naturally bad, or rendered so by intemperance.

In each of these different affections, the whole malady is often confined to the skin and cellular membrane underneath it; and no other symptoms attend, than the usual general ones, or such as arise from the formation of matter or sloughs in the part immediately affected. But it also often happens, that, added to these, the patient is made unhappy by complaints arising from an influence, which such mischief has on parts in the neighbourhood of the disease; such as the urinary bladder, the vagina, the urethra, the hæmorrhoidal vessels, and the rectum; producing retention of urine, strangury, dysury, bearing down, tenesmus, piles, diarrhœa, or obstinate costiveness: which complaints are sometimes so pressing, as to claim all our attention. On the other hand, large quantities of matter, and deep sloughs are sometimes formed, and great devastation committed on the parts about the rectum, with little or no previous pain, tumour, or inflammation.

Sometimes the disease makes its first appearance in an induration of the skin, near to the verge of the anus, but without pain or alteration of colour; which hardness gradually softens and suppurates. The matter, when let out, in this case, is small in quantity, good in quality; and the sore is superficial, clean, and well-conditioned. On the contrary, it now and then happens, that although the pain is but little, and the inflammation apparently slight, yet the matter is large in quantity, bad in quality, extremely offensive, and proceeds from a deep crude hollow, which bears an ill-natured aspect.

The place also where the abscess points, and where the matter, if let alone, would burst its way out, is various and uncertain. Sometimes it is in the buttock, at a distance from the anus; at other times near its verge, or in the perineum: and this discharge is made sometimes from one orifice only, sometimes from several. In some cases, there is not only an opening through the skin externally, but another through the intestine into its cavity: in others, there is only one orifice, and that either external, or internal.

Sometimes the matter is formed at a considerable distance from the rectum, which is not even laid bare by it; at others, it is laid bare also, and not perforated: it is also sometimes not only denuded, but pierced; and that in more places than one.

All consideration of preventing suppuration, is generally out of the question: and our business, if called at the beginning, must be to moderate the symptoms; to forward the suppuration; when the matter is formed, to let it out; and to treat the sore in such manner, as shall be most likely to produce a speedy and lasting cure.

When there are no symptoms which require particular attention, and all that we have to do is to assist the maturation of the tumour, a soft poultice is the best application. When the disease is fairly of the phlegmonoid kind, the thinner the skin is suffered to become, before the abscess be opened, the better: as the induration of the parts about will thereby be the more dissolved, and, consequently, there will be the less to do after such opening has been made. This kind of tumour is generally found in people of full, sanguine habits; and who, therefore, if the pain be great, and the fever high, will bear evacuation, both by phlebotomy, and gentle cathartics: which is not often the case of those, who are said to be of bilious constitutions; in whom

the inflammation is of a larger extent, and in which the skin wears the yellowish tint of the erysipelas; persons of such kind of habit, and in such circumstances, being in general seldom capable of bearing large evacuation.

When the inflammation is erysipelatous the quantity of matter formed is small, compared with the size and extent of the tumour; the disease is rather a sloughy, putrid state of the cellular membrane, than an imposthumation; and therefore, the sooner it is opened, the better: if we wait for the matter to make a point, we shall wait for what will not happen; at least, not till after a considerable length of time: during which, the disease in the membrane will extend itself, and, consequently, the cavity of the sinus, or abscess, be thereby greatly increased.

When, instead of either of the preceding appearances, the skin wears a dusky, purplish-red colour; has a doughy, unresisting kind of feel, and is very little sensible: when these circumstances are joined with an unequal, faultering kind of pulse, irregular shiverings, a great failure of strength and spirits, and inclination to doze, the case is formidable, and the event generally fatal.

The habit, in these circumstances, is always bad; sometimes from nature, but much more frequently from gluttony and intemperance. What assistance art can lend, must be administered speedily; every minute is of consequence; and if the disease be not stopped, the patient will sink. Here is no need for evacuation of any kind: recourse must be immediately had to medical assistance; the part affected should be frequently fomented with hot spirituous fomentations; a large and deep incision should be made into the diseased parts, and the application made to it should be of the warmest, most antiseptic kind.

This also is a general kind of observation, and equally applicable to the same sort of disease in any part of the body. Our ancestors have thought fit to call it in some a carbuncle, and in others, by other names; but it is (wherever seated) really and truly, a gangrene of the cellular and adipose membrane; it always implies great degeneracy of habit, and, most commonly, ends ill.

Strangury, dysury, and even total retention of urine, are no very uncommon attendants upon abscesses forming in the neighbourhood of the rectum and bladder; more especially, if the seat of them be near the neck of the latter.

They sometimes continue from the first attack of the inflammation, until the matter is formed, and has made its way outward; and sometimes last a few hours only.

The two former most commonly are easily relieved by the loss of blood, and the use of gum-arabic, with nitre, &c. But in the last (the total retention), they who have not often seen this case, generally have immediate recourse to the catheter; but the practice is essentially wrong.

The neck of the bladder does certainly participate, in some degree, in the said inflammation. But, the principal part of the complaint arises from irritation, and the disease is, strictly speaking, spasmodic. The manner in which an attack of this kind is generally made; the very little distention which the bladder often suffers; the small quantity of urine sometimes contained in it, even when the symptoms are most pressing; and the most certain, as well as safe, method of relieving it; all tend to strengthen such opinion.

But whether we attribute the evil to inflammation, or to spasmodic irritation, whatever can, in any degree, contribute to the exasperation of either, must be manifestly wrong. The violent passage of the catheter through the neck of the bladder (for violent in such circumstances it must be) can never be right.

If the instrument be successfully introduced, it must either be withdrawn as soon as the bladder is emptied, or it must be left in it: if the former be done, the same cause of retention remaining, the same effect returns; the same pain and violence must again be submitted to, under (most likely) increased difficulties. On the other hand, if the catheter be left in the bladder, it will often, while its neck is in this state, occasion such disturbance, that the remedy (as it is called) will prove an exasperation of the disease, and add to the evil it is designed to alleviate; nor is this all; for the resistance which the parts, while in this state, make, is sometimes so great, that if any violence be used, the instrument will make for itself a new route in the neighbouring parts, and lay the foundation of such mischief as frequently baffles all our art.

The true, safe, and rational method of relieving this complaint is by evacuation and anodyne relaxation: this not only procures immediate ease, but does, at the same time, serve another very material purpose; which is that of maturating the abscess. Loss of blood is necessary; the quantity to be determined by the strength and state of the patient: the intestines should also be emptied, if there be time for so doing, by a gentle cathartic; but the most effectual relief will be from the warm bath, or semicupium, the application of bladders with hot water to the pubes and perineum, and, above all other remedies, the injection of glysters, con-

sisting of warm water, oil, and opium. There may have been cases which have resisted and baffled this method of treatment; but Pott has never met with them.

A painful tenesmus is no uncommon attendant upon an inflammation of the parts about the rectum.

If a dose of rhubarb, joined with a warm anodyne, such as the conf. mithrid. or suchlike, does not remove it, the injection of thin starch and opium, or tinct. thebaic. is almost infallible.

The bearing down, in females, as it proceeds in this case, from the same kind of cause (viz. irritation) admits relief from the same means as the tenesmus.

In some habits an obstinate costiveness attends this kind of inflammation, accompanied, not unfrequently, with a painful distention and enlargement of the hæmorrhoidal vessels, both internally and externally. While a quantity of hard feces are detained within the large intestines, the whole habit must be disordered; and the symptomatic fever, which necessarily accompanies the formation of matter, must be considerably heightened. And while the vessels surrounding the rectum (which are large and numerous) are distended, all the ills proceeding from pressure, inflammation, and irritation, must be increased. Phlebotomy, laxative glysters, and a low, cool regimen, must be the remedies; while a soft cataplasm applied externally serves to relax and mollify the swollen, indurated piles, at the same time that it hastens the suppuration.

When the abscesses have formed, and are fit to be opened, or when they have already burst, they may be reduced to two general heads, viz.

1. Those, in which the intestine is not at all interested; and,

2. Those, in which it is either laid bare, or perforated.

In making the opening, the knife or lancet should be passed in deep enough to reach the fluid; and, when it is in, the incision should be continued upward and downward, in such manner as to divide all the skin covering the matter. By these means, the contents of the abscess will be discharged at once; future lodgment of matter will be prevented; convenient room will be made for the application of proper dressings; and there will be no necessity for making the incision in different directions, or for removing any part of the skin composing the verge of the anus.

Notwithstanding all these collections of matter are generally called *fistulæ*, and are all supposed to affect the intestinum rectum, yet it is very certain that the seat of the abscess, is sometimes at such distance from the gut, that it is not at all interested by it; and that none of these cases either are, or can be originally *fistulæ*.

In this state of the disease, we have no more necessarily to do with the intestine, than if it was not there; the case is to be considered merely as an abscess in the cellular membrane.

Suppose a large and convenient opening to have been made by a simple incision; the contents of the abscess to have been thereby discharged; and a sore or cavity produced, which is to be filled up.

The term *filling up*, and the former opinion, that the induration of the parts about is a diseased callosity, have been the two principal sources of misconduct in these cases.

The old opinion, with regard to hollow and hardness, was that the former is caused entirely by loss of substance: and the latter, by diseased alteration in the structure of the parts.

The consequence of which opinion was, that as soon as the matter was discharged, the cavity was filled and distended, in order to procure a gradual regeneration of flesh, and the dressings, with which it was so filled, were most commonly of the escharotic kind, intended for the dissolution of hardness.

The practice is a necessary consequence of the theory. Whoever supposes diseased callosity, and great loss of substance, will necessarily think himself obliged to destroy the former, and to prevent the cavity, formed by the latter, from filling up too hastily. On the other hand, he who regards the cavity of the abscess as being principally the effect of the gradual distraction and separation of its sides, with very little loss of substance, compared with the size of the said cavity; and who looks upon the induration round about, as nothing more than a circumstance which necessarily accompanies every inflammation in membranous parts, more especially in those which tend to suppuration; will, upon the smallest reflection, perceive, that the dressings applied to such cavity ought to be so small in quantity, as to permit nature to bring the sides of the cavity toward each other, and that such small quantity of dressings ought to consist of materials proper only to encourage easy and gradual suppuration.

Suppuration is to be produced and maintained, not by thrusting in such applications, as by their quantity distend, and by their quality irritate and destroy; but by dressing lightly and easily with such as appease, relax and soften.

If the hollow, immediately it is opened, be filled with dressings (of any kind), the sides of it will be kept from approaching each other, or may even be farther separated. But if this cavity be not filled, or have little or no dressings of any kind in-

troduced into it, the sides immediately collapse; and, coming nearer and nearer, do, in a very short space of time, convert a large hollow into a small sinus. And this is also constantly the case, when the matter, instead of being let out by an artificial opening, escapes through one made by the bursting of the containing parts.

True, this sinus will not always become perfectly closed; but the aim of nature is not, therefore, the less evident; nor the hint, which art ought to borrow from her, the less palpable.

In this, as in most other cases, where there are large sores, or considerable cavities, a great deal will depend on the patient's habit, and the care that is taken of it: if that be good, or if it be properly corrected, the surgeon will have very little trouble in his choice of dressings; only to take care that they do not offend either in quantity or quality: but if the habit be bad, or injudiciously treated, he may use the whole farrago of externals, and only waste his own and his patient's time.

By light, easy treatment, large abscesses formed in the neighbourhood of the rectum will sometimes be cured, without any necessity occurring of meddling with the said gut. But it much more frequently happens, that the intestine, although it may not have been pierced or eroded by the matter, has yet been so stripped or denuded, that no consolidation of the sinus can be obtained, but by a division; that is, by laying the two cavities, viz. that of the abscess, and that of the intestine, into one.

When the intestine is found to be separated from the surrounding parts by the matter, the operation of dividing it had better (on many accounts) be performed at the time the abscess is first opened, than be deferred to a future one. For, if it be done properly, it will add so little to the pain, which the patient must feel by opening the abscess, that he will seldom be able to distinguish the one from the other, either with regard to time or sensation: whereas, if it be deferred, he must either be in continual expectation of a second cutting, or feel one at a time when he does not expect it.

The intention in this operation is to divide the intestine rectum from the verge of the anus up as high as the top of the hollow in which the matter was formed; thereby to lay the two cavities of the gut and abscess into one; and by means of an open, instead of a hollow or sinuous sore, to obtain a firm and lasting cure.

For this purpose, the curved, probe-pointed knife, with a narrow blade, is the most useful and handy instrument of any. This, introduced into the sinus, while the surgeon's fore-finger is in the intestine, will enable him to divide all that can ever require division; and that with less pain to the patient, with more facility to the operator, as well as with more certainty and expedition than any other instrument whatever. If there be no opening in the intestine, the smallest degree of force will thrust the point of the knife through, and thereby make one: if there be one already, the same point will find and pass through it. In either case, it will be received by the finger in ano; will thereby be prevented from deviating, and being brought out by the same finger, must necessarily divide all that is between the edge of the knife, and the verge of the anus: that is, must by one simple incision (which is made in the smallest space of time imaginable) lay the two cavities of the sinus and of the intestine into one.

Authors make a very formal distinction between those cases in which the intestine is pierced by the matter, and those in which it is not; but although this distinction may be useful when the different states of the disease are to be described, yet in practice, when the operation of dividing the gut becomes necessary, such distinction is of no consequence at all; it makes no alteration in the degree, kind, or quantity of pain which the patient is to feel; the force required to push the knife through the tender gut is next to none, and when its point is in the cavity, the cases are exactly similar.

Immediately after the operation, a soft dossil of fine lint should be introduced (from the rectum) between the divided lips of the incision; as well to repress any slight hæmorrhage, as to prevent the immediate reunion of the said lips; and the rest of the sore should be lightly dressed with the same. This first dressing should be permitted to continue, until a beginning suppuration renders it loose enough to come away easily; and all the future ones should be as light, soft, and easy as possible; consisting only of such materials as are likely to promote kindly and gradual suppuration. The sides of the abscess are large; the incision must necessarily, for a few days, be inflamed; and the discharge will, for some time, be discoloured and gleety: this induration, and this sort of discharge, are often mistaken for signs of diseased callosity, and undiscovered sinuses; upon which presumptions, escharotics are freely applied, and diligent search is made for new hollows: the former of these most commonly increase both the hardness and the gleet; and by the latter new sinuses are sometimes really produced. These occasion a repetition of escharotics, and, perhaps, of incisions; by which means, cases which

at first, and in their own nature were simple and easy of cure, are rendered complex and tedious.

To quit reasoning, and speak to fact only: In the great number of these cases, which must have been in St. Bartholomew's Hospital, within these ten or twelve years, *I do aver*, (says Pott) *that I have not met with one, in the circumstances before described, that has not been cured by mere simple division, together with light, easy dressings: and that I have not, in all that time, used for this purpose, a single grain of præcipitate, or of any other escharotic.*

The best and most proper method of dividing the intestine, in the case of a collection of matter formed juxta anum, we have already described.

The intention to be aimed at by incision in the present case, is exactly the same, and ought to be executed in the same manner.

Let us first suppose the matter to be fairly formed; to have made its point, as it is called; and to be fit to be let out.

Where such point is, that is, where the skin is most thin, and the fluctuation most palpable, there the opening most certainly ought to be made, and always with a cutting instrument, not caustic, as was formerly done.

We have supposed the matter of the abscess to have been formed, and collected; but still to have been contained within the cavity, until let out by an incision.

We are now to consider it, as having made its own way out, without the help of art.

This state of the disease is also subject to some variety of appearance; and these different appearances have produced, not only a multiplicity of appellations, but a groundless supposition also, of a variety of essentially different circumstances.

When a discharge of the matter by incision is too long delayed or neglected, it makes its own way out, by bursting the external parts somewhere near to the fundament, or by eroding and making a hole through the intestine into its cavity; or sometimes by both. In either case, the discharge is made sometimes by one orifice only, and sometimes by more. Those, in which the matter has made its escape by one or more openings, through the skin only, are called *blind external fistulæ;* those, in which the discharge has been made into the cavity of the intestine, without any orifice in the skin, are named *blind internal*; and those, which have an opening both through the skin, and into the gut, are called *complete fistulæ.*

Thus, all these cases are deemed fistulous, when hardly any of them ever are so: and none of them necessarily. They are still mere abscesses, which are burst without the help of art; and, if taken proper and timely care of will require no such treatment as a true fistula may possibly stand in need of.

The most frequent of all are what are called the *blind external*; and the *complete.* The method whereby each of these states may be known is, by introducing a probe into the sinus by the orifice in the skin, while the fore-finger is within the rectum: this will give the examiner an opportunity of knowing exactly the true state of the case, with all its circumstances.

Whether the case be, what is called a complete fistula, or not; that is, whether there be an opening in the skin only, or one there, and another in the intestine, the appearance to the eye is much the same. Upon discharge of the matter, the external swelling subsides, and the inflamed colour of the skin disappears, the orifice, which at first was sloughy and foul, after a day or two are past, becomes clean and contracts in size; but the discharge, by fretting the parts about, renders the patient still uneasy.

As this kind of opening seldom proves sufficient for a cure, (though it sometimes does) the induration, in some degree, remains; and if the orifice happens not to be a depending one, some part of the matter lodges, and is discharged by intervals, or may be pressed out by the fingers of an examiner. The disease, in this state, is not very painful; but it is troublesome, nasty and offensive: the continual discharge of a thin kind of fluid from it, creates heat, and causes excoriation in the parts about; it daubs the linen of the patient; and is, at times, very fetid; the orifice also sometimes contracts so, as not to be sufficient for the discharge; and the lodgment of the matter then occasions fresh disturbance.

The means of cure proposed and practised by our ancestors, were three, viz. caustic, ligature, and incision.

The intention in each of these is the same, viz. to form one cavity of the sinus and intestines by laying the former into the latter. The two first are now completely, and most properly, exploded.

Hitherto we have considered the disease either as an abscess, from which the matter has been let out by an incision, made by a surgeon; or from which the contents have been discharged by one single orifice, formed by the bursting of the skin somewhere about the fundament. Let us now take notice of it, when instead of one such opening, there are several.

This state of the case generally happens when the quantity of matter collected has been large, the inflammation of considerable extent, the adipose membrane very sloughy, and the skin worn

very thin before it burst.—It is, indeed, a circumstance of no real consequence at all; but from being misunderstood, or not properly attended to, is made one of additional terror to the patient, and additional alarm to the inexperienced practitioner: for it is taught, and frequently believed, that each of these orifices is an outlet from, or leads to a distinct sinus, or hollow; whereas in truth, the case is most commonly, quite otherwise; all these openings are only so many distinct burstings of the skin covering the matter; and do all, be they few or many, lead and open immediately into the one single cavity of the abscess: they neither indicate, nor lead to, nor are caused by distinct sinuses; nor would the appearance of twenty of them (if possible) necessarily imply more than one general hollow.

If this account be a true one, it will follow, that the chirurgic treatment of this kind of case ought to be very little, if at all, different from that of the preceding; and that all that can be necessary to be done, must be to divide each of these orifices in such manner as to make one cavity of the whole. This the probe-knife will easily and expeditiously do; and when that is done, if the sore, or more properly its edges, should make a very ragged, uneven appearance, the removal of a small portion of such irregular angular parts will answer all the purposes of making room for the application of dressings, and for producing a smooth, even cicatrix after the sore shall be healed.

When a considerable quantity of matter has been recently let out, and the internal parts are not only in a crude, undigested state, but have not yet had time to collapse, and approach each other; the inside of such cavity will appear large; and if a probe be pushed with any degree of force, it will pass in more than one direction into the cellular membrane by the side of the rectum. But let not the unexperienced practitioner be alarmed at this, and immediately fancy that there are so many distinct sinuses; neither let him, if he be of a more hardy disposition, go to work immediately with his director, knife, or scissars: let him enlarge the external wound by making his incision freely; let him lay all the separate orifices open into that cavity; let him divide the intestine lengthwise by means of his finger in ano; let him dress lightly and easily; let him pay proper attention to the habit of the patient; and wait, and see what a few days, under such conduct, will produce. By this he will frequently find, that the large cavity of the abscess will become small and clean; that the induration round about will gradually lessen; that the probe will not pass in that manner into the cellular membrane; and consequently, that his fears of a multiplicity of sinuses were groundless. On the contrary, if the sore be crammed or dressed with irritating, or escharotic medicines, all the appearances will be different: the hardness will increase, the lips of the wound will be inverted, the cavity of the sore will remain large, crude, and foul; the discharge will be thin, gleety, and discoloured; the patient will be uneasy and feverish: and, if no new cavities are formed by the irritation of parts, and confinement of matter, yet the original one will have no opportunity of contracting itself: and may very possibly become truly fistulous.

Sometimes the matter of an abscess, formed juxta anum, instead of making its way out through the skin, externally near the verge of the anus, or in the buttock, pierces through the intestine only. This is what is called a *blind internal fistula.*

In this case, after the discharge has been made, the greater part of the tumefaction subsides, and the patient becomes easier. If this does not produce a cure, which sometimes, though very seldom, happens, some small degree of induration generally remains in the place where the original tumour was; upon pressure on this hardness, a small discharge of matter is frequently made per anum; and sometimes the expulsion of air from the cavity of the abscess into that of the intestine may very palpably be felt, and clearly heard; the stools, particularly, if hard, and requiring force to be expelled, are sometimes smeared with matter; and although the patient, by the bursting of the abscess, is relieved from the acute pain which the collection occasioned, yet he is seldom perfectly free from a dull kind of uneasiness, especially if he sits for any considerable length of time in one posture. The real difference between this kind of case, and that in which there is an external opening (with regard to method of cure) is very immaterial: for an external opening must be made, and then all difference ceases. In this, as in the former, no cure can reasonably be expected, until the cavity of the abscess, and that of the rectum, are made one; and the only difference is, that in the one case we have an orifice at, or near the verge of the anus, by which we are immediately enabled to perform that necessary operation; in the other, we must make one.

We come now to that state of the disease, which may truly and properly be called *fistulous.* This is generally defined, *sinus angustus, callosus, profundus; acri sanie diffluens:* or, as Dionis translates it,

" Un ulcère profond, & caverneux, dont l'entrée est etroite, & le fond plus large; avec issue d'un pus acre & virulent; et accompagné de callosités."

Various causes may produce or concur in producing such a state of the parts concerned as will constitute a fistula, in the proper sense of the word; that is, a deep, hollow sore, or sinus, all parts of which are so hardened, or so diseased, as to be absolutely incapable of being healed, while in that state; and from which a frequent, or daily discharge is made, of a thin, discoloured sanies, or fluid.

These are divided into two classes, viz. those which are the effect of neglect, distempered habit, or of bad management, and which may be called, without any great impropriety, local diseases; and those which are the consequence of disorders, whose origin and seat is not in the immediate sinus or fistula, but in parts more or less distant, and, which, therefore, are not local complaints.

The natures and characters of these are obviously different by description; but they are still more so in their most frequent event, the former being generally curable by proper treatment; the latter frequently not so by any means whatever.

Under the former are reckoned all such cases as were originally mere collections of matter within the coats of the intestine rectum, or in the cellular membrane surrounding the said gut; but which, by being long neglected, grossly managed, or, by happening in habits which were disordered, and for which disorders no proper remedies were administered, suffer such alteration, and get into such state, as to deserve the appellation of *fistulæ*.

Under the latter, are comprised all those cases in which the disease has its origin and first state in the higher and more distant parts of the pelvis, about the os sacrum, lower vertebræ of the loins, and parts adjacent thereto; and are either strumous, or the consequence of long and much distempered habits; or the effect of, or combined with other distempers, local, or general; such as a diseased neck of the bladder, or prostate gland, or urethra, &c. &c. &c.

Among the very low people, who are brought into hospitals, we frequently meet with cases of the former kind: cases, which, at first, were mere simple abscesses; but which from uncleanliness, from intemperance, negligence, and distempered constitutions, become such kind of sores, as may be called *fistulous*.

In these the art of surgery is undoubtedly, in some measure, and at some time, necessary; but it very seldom is the first or principal fountain from whence relief is to be sought: the general effects of intemperance, debauchery, and diseases of the habit are first to be corrected and removed, before surgery can with propriety, or with reasonable prospect of advantage be made use of.

The surgery required in these cases, consists in laying open and dividing the sinus, or sinuses, in such manner that there may be no possible lodgment for matter, and that such cavities may be fairly opened lengthwise into that of the intestine rectum: if the internal parts of these hollows are hard, and do not yield good matter, which is sometimes the case more especially where attempts have been made to cure by injecting astringent liquors, such parts should be lightly scratched or scarified with the point of a knife or lancet, but not dressed with escharotics; and if, either from the multiplicity of external orifices, or from the loose, flabby, hardened, or inverted state of the lips and edges of the wound near to the fundament, it seems very improbable that they can be got into such a state as to heal smooth and even, such portion of them should be cut off as may just serve that purpose. The dressings should be soft, easy, and light; and the whole intent of them to produce such suppuration as may soften the parts, and may bring them into a state fit for healing.

If a loose, fungous kind of flesh has taken possession of the inside of the sinus, (a thing much talked of, and very seldom met with) a slight touch of the lunar caustic will reduce it sooner, and with better effect on the sore, than any other escharotic whatever.

The method and medicines by which the habit of the patient was corrected, must be continued (at least in some degree) through the whole cure; and all those excesses and irregularities which may have contributed to injure it, must be avoided.

By these means, cases which at first have a most disagreeable and formidable aspect, are frequently brought into such state, as to give very little trouble in the healing.

If the bad state of the sore arises merely from its having been crammed, irritated, and eroded; the method of obtaining relief is so obvious, as hardly to need recital.

A patient who has been so treated, has generally some degree of fever; has a pulse which is too hard, and too quick; is thirsty, and does not get his due quantity of natural rest. A sore which has been so dressed, has generally a considerable degree of inflammatory hardness round about; the lips and edges of it are tumid, full, inflamed, and sometimes in-

verted; the whole verge of the anus is swollen; the hæmorrhoidal vessels are loaded; the discharge from the sore is large, thin, and discoloured; and all the lower part of the rectum participates of the inflammatory irritation, producing pain, bearing down, tenesmus, &c. *Contraria contrariis* is never more true than in this instance: the painful, uneasy state of the sore, and of the rectum, is the great cause of all the mischief, both general and particular; and the first intention must be to alter that. All escharotics must be thrown out, and disused; and in lieu of them, a soft digestive should be substituted, in such manner as not to cause any distention, or to give any uneasiness from quantity; over which a poultice should be applied: these dressings should be renewed twice a day; and the patient should be enjoined absolute rest. At the same time, attention should be paid to the general disturbance, which the former treatment may have created. Blood should be drawn off from the sanguine; the feverish heat should be calmed by proper medicines; the languid and low should be assisted with the bark and cordials; and ease in the part must, at all events, be obtained by the injection of anodyne clysters of starch and opium.

If the sinus has not yet been laid open, and the bad state of parts is occasioned by the introduction of tents imbued with escharotics, or by the injection of astringent liquors, (the one for the destruction of callosity, the other for the drying up gleet and humidity) no operation of any kind should be attempted until both the patient and the parts are easy, cool, and quiet: cataplasms, clysters, rest, and proper medicines must procure this: and when that is accomplished, the operation of dividing the sinus, and (if necessary) of removing a small portion of the ragged edges, may be executed, and will, in all probability, be attended with success. On the contrary, if such operation be performed while the parts are in a state of inflammation, the pain will be great, the sore for several days very troublesome, and the cure prolonged or retarded, instead of being expedited.

Abscesses, and collections of diseased fluids are frequently formed about the lumbar vertebræ, under the psoas muscle, and near to the os sacrum; in which cases, the said bones are sometimes carious, or otherwise diseased. These sometimes form sinuses, which run down by the side of the rectum, and burst near to the fundament.

The chirurgic treatment of such sores and sinuses can have little influence on the remote situation, where the collection of matter is originally formed. (See *Lumbar Abscess.*)

Fistulous sores, sinuses, and indurations about the anus, which are consequences of diseases of the neck of the bladder, and urethra, called fistulæ in perinæo, require separate and particular consideration. (See *Fistula in Perinæo.*)

Pott may be considered as the source and authority of the foregoing remarks.

For information, relative to former opinions concerning *fistula in ano*, refer to *Celsus; Heister's Surgery; Le Dran's Operations; Sharp's Operations; La Faye's Notes on Dionis. In Kirkland's Medical Surgery, Vol. 2, may be found an account of the opinions and practice of many former celebrated practitioners. The best modern practical remarks are contained in Pott's Treatise on the Fistula in Ano, in which he has offered also an excellent critique on some opinions of Le Dran, De la Faye, and Cheselden. The reader may also consult with advantage Sabatier's Médecine Opératoire, Tom. 2; B. Bell's Surgery, Vol. 2; Latta's Surgery, Vol. 2.*

ANUS, PROLAPSUS OF.

When a portion of the rectum is protruded out of the anus, in a preternatural degree, the disorder is termed *prolapsus ani*. Sometimes, only a very small part of the gut is thus displaced; on other occasions, there is a very considerable portion of it.

The sphincter ani, and the surrounding parts, serve, in the healthy state, as a base, and support, for the lower part of the rectum, and every thing, which tends to weaken them, tends, also, to produce a prolapsus ani.

The most common cause of this disease, however, is referrible to too violent and repeated exertions of the rectum itself, excited by some source of irritation about the extremity of this intestine. Thus, the too frequent employment of aloetic medicines, the action of which particularly affects the large intestines, often occasions the above consequence. The same thing results from small worms, known by the name of ascarides, and which, lodging about the lower part of the rectum, occasionally cause excessive irritatation. Habitual costiveness; hemorrhoids; in a word, every thing, which by stimulating the rectum, excites too violent an action of this intestine, may induce the complaint under consideration.

There are numerous instances, in which a prolapsed portion of the rectum has remained, for a long while, unreduced, and in which, notwithstanding such neglect, no serious bad consequences have ensued. It follows from this, that this bowel can bear exposure to the external air much better, than any other

part of the intestinal canal. But, we ought never, on this account, to omit doing every thing in our power for the immediate reduction of the intestine. Authors of surgical works have, not uncommonly, recommended fomenting the prolapsed part with emollient and antiseptic decoctions, before making an attempt to reduce it. They even advise the operator, for the purpose of succeeding with more ease, to cover his fingers with linen, smeared with wax and oil. But, all such preparations are useless, and, when a surgeon is called to a patient afflicted with a prolapsus ani, the greatest service he can render, is to put back the displaced part, as quickly as possible, into its natural situation, without leaving the intestine exposed to the dangerous effects, which may arise during the time wasted in employing fomentations, &c. Also, as much greater manual dexterity can be made use of, when the fingers are perfectly uncovered, than when they have greasy gloves on, it is best not to follow the latter method. However, if it should be judged proper to cover the hands with any thing, a piece of fine cotton will best answer the purpose.

The patient being in bed, lying upon his side, or, what is better, on the abdomen, while his buttocks are raised rather higher than the rest of the body, the surgeon is to make strong, but equal pressure, with the palm of his hand on the lower portion of the prolapsed intestine. By continuing such pressure, the intestine may, in general, be easily reduced. But, if this plan should not suffice, the upper part of the protruded intestine must be compressed with the fingers of one hand, while the lower part is pressed upward by the palm of the other one. In this way, we are almost sure to succeed. It is true, that if, in consequence of having too long delayed the reduction, or from some other cause, the gut has become much swollen and inflamed, it will be impossible to reduce the part, before such symptoms have been subdued. For this purpose, it may be proper to take some blood from the patient, in such quantity, as his strength will allow. The intestine may also be fomented with a warm solution of the acetite of lead, (saccharum saturni.) When the swelling has been diminished by these means, there will be no difficulty in replacing the parts, by pursuing the plan already explained.

The greatest difficulty is not the returning of the intestine, but keeping it in its place. The latter object often gives a great deal of trouble. For, after the bowel has frequently descended, the sphincter sometimes becomes so weakened, that it can no longer keep the part supported. Hence, the complaint not only recurs whenever the patient goes to stool; but, even whenever he walks, or places himself in an erect posture; as there are examples of.

Different bandages have been devised, for supporting the anus after its reduction. But, it is not an easy matter to invent one, which is in every respect adapted to what such an inconvenience requires. A compress, doubled several times, is usually applied to the anus, and supported in this position by means of a T bandage. In many cases, this method of keeping up the intestine answers very well. A machine was invented by Mr. Gooch, which has the double advantage of supporting the intestine more securely, than any other, with which we are acquainted, and of allowing the patient to take a great deal more exercise, than he could do without its assistance. (See *Gooch's Chirurgical Works, Vol.* 2, *p.* 150. *Edit.* 1792.)

But, what, in our opinion, is still better, than all such contrivances, are elastic gum pessaries, which were invented a few years ago by M. Bernard, an ingenious artist, who has employed this substance for making various articles, which are used by surgeons. The instrument, which we have just mentioned, consists of an oblong oval body, rounded at one end, and terminating at the other in a narrow, rather long neck, with a flat border at its extremity. The body of this instrument, when introduced into the intestine beyond the sphincter, dilates and supports the gut, while the sphincter embraces its neck, and the border of this part of the instrument hinders it from ascending too far up the rectum. A string is also attached to the edge, which tends to prevent the occurrence. This pessary is very smooth, and, consequently, cannot do any injury to the parts. It is also very light, being only composed of a very thin, though tolerably solid substance. As it is pierced at its termination, it does not impede the discharge of air, which might otherwise incommode the patient.

When the intestine is protruded at the time the patient is at stool, the part is to be immediately replaced. This the patient should accustom himself to do without assistance, and then the bandage, or pessary, is to be applied. In order to strengthen the sphincter ani and adjacent parts, the weakness of which must, in the majority of cases, be regarded as the entire cause of the disease, the patient should take preparations of bark and steel, make use of the cold bath, and frequently have cold water dashed against his buttocks and loins. Astringent injections, particularly, such are composed of an infusion of gall-nuts, or oak-bark,

are also very serviceable. A small quantity of alum, or sugar of lead, has sometimes been added to these injections; but, in general, all additions of saline substances are to be deemed improper, because salts usually produce an irritation of the intestine.

Diseases of this kind may always be cured, or at least palliated, so as to be very bearable, by the employment of some of the above means.

Before concluding this article, we shall observe, however, that a much more serious disorder has been confounded with the prolapsus ani; viz. one, in which a considerable portion of the colon, cæcum, and, even sometimes, of the ilium, becomes everted and pushed out at the anus. The generality of practitioners consider this occurrence in the same point of view, as the disease of which we have just been treating. In this case, they believe that the whole of the rectum becomes everted, in consequence of the relaxation of the sphincter and levatores ani, and, that it then draws after it other portions of the intestinal canal. But, they ought to have been undeceived by the strangulation, which sometimes occurs under such circumstances, and which not only throws a great obstacle in the way of the reduction of the displaced part, but even sometimes brings on mortification. Besides the connexions of the rectum with the neighbouring parts, by means of the cellular substance, which surrounds it; and the attachment of this intestine to the posterior surface of the urinary bladder; render the above origin of the complaint impossible. Such an explanation could only be admitted with regard to those protrusions of the rectum, which come on in a very slow manner. This account could not afford a satisfactory explanation of certain cases, in which the everted intestine presents a very enormous tumour. Fabricius ab Aquapendente mentions his having seen tumours occasioned by a prolapsus of the rectum, which were as long as the forearm, and as large as the fist. In the *Mélanges des Curieux de la Nature*, we find an account of a tumour of this sort, which was two feet long, and occurred in a woman from parturition. Nor is a more satisfactory reason assigned for these cases, by supposing, that they originate from a relaxation of the villous coat of the rectum, and its separation from the muscular one. We are not authorized to imagine, that such a separation can take place to a considerable extent, nor so suddenly, as to give rise to the phænomena, sometimes remarked in this disease.

But more accurate observations have removed all doubt upon this subject. In the eleventh volume of the *Mémoires de l'Académie de Chirurgie, edit. in* 12*mo.* we read an account of a pretended prolapsus of the rectum, which, after death, was discovered to be an eversion of the cæcum, the greater part of the colon being found at the lower end of this intestine, and most of the rectum at its upper part. This eversion began at the distance of more than eleven inches from the anus, and terminated about five or six from this opening, the tumour, formed by the disease, having been reduced some time before the child's death. It was impossible to draw back the everted part, in consequence of the adhesions, which it had contracted. Another dissection has evinced the same fact. A child, having suffered very acute pain in the abdomen, after receiving a blow, had a prolapsus of intestine through the anus, about six or seven inches long. This was taken for a prolapsus of the rectum. After death, the termination of the bowel out of the anus was found to be nothing less, than the cæcum, which had passed through the colon, and rectum, and made a protrusion at the anus. See *Intussusceptio.* (*For information on the preceding subject, the reader may consult with advantage, l'Encyclopédie Méthodique, Partie Chirurgicale, De la chûte du fondement, Tom.* 1, *p.* 150. *Gooch's Chirurgical Works, Vol.* 2, *p.* 150. *Edit.* 1792. *Recherches Historiques, sur la Gastrotomie, ou l'ouverture du bas-ventre, dans le cas du Volvulus, &c. par M. Hevin in Mém. de l'Acad. Royale de Chirurgie, Tom.* 11, *p.* 315. *Edit. in* 12*mo. Richerand's Nosographie Chirurgicale, Tom.* 3, *p.* 421, *&c. Richter's Anfangsgrunde der Wundarzneykunst, Band* 6, *Von dem Vorfalle aus dem Hintern, p.* 403. *Edit.* 1802.

ANUS, ARTIFICIAL.

This signifies an accidental opening in the parietes of the abdomen, to which opening some part of the intestinal canal tends, and through which the feces are, either wholly, or in part, discharged.

When a strangulated hernia occurs, in which the intestine is simply pinched, and this event is unknown; when the occurrence has not been relieved by the usual means; or when the necessary operation has not been practised in time; the protruded part becomes gangrenous, and the feces escape. Putrefaction takes place in the cellular substance, and under the adjoining integuments, while the gangrenous affection of the tumour spreads from within outward. One or more openings soon form in the mortified parts, and through these apertures the feces are discharged, until the separation of the sloughs gives a freer vent to the excrement. But if the patient should be at last operated upon, his feces are

discharged through the wound, and the intestines are more easily emptied. In both cases, the excrement continues to be discharged from the opening, when the loss of substance in the intestine is great, and a considerable contraction of the bowels has taken place below the part affected. When the mortification has been too extensive, and the cicatrix, following the detachment of the dead parts, has greatly diminished the diameter of the bowels, the feces more readily pass out of the wound, than along the intestinal canal, and, consequently, they are entirely discharged through the artificial opening. In this way, an artificial anus is formed, through which the excrement is evacuated during life.

The same occurrence may follow wounds, penetrating the abdomen, and doing considerable injury to the intestines. The inflammation, which always accompanies such wounds, occasions salutary adhesions, between the edges of the divided intestine and those of the opening in the peritoneum and muscles. This prevents any extravasation of matter in the abdomen. The fixed and permanent situation of the large intestines renders all wounds, occurring to them, much more prone, than those befalling the small intestines, to this consequence, so favourable in many respects. However, artificial anuses have been known to form after wounds of the small intestines. A case of this sort may be perused in Fernel, and a second in Bauhin. (*Sabatier sur les Anus contre Nature, in Mem. de l'Acad. de Chir. Tom. 5. Edit. in* 12*mo*.)

In cases of hernia with gangrene, an artificial anus is formed, under the above circumstances, according to the design of nature, and it would frequently be wrong to hinder the occurrence, even though it were practicable to heal the wound, which is the situation of it. For, the intestine being too much contracted at the place of the cicatrix, the patient would continue subject to cholic complaints. In this manner, he might be put in more or less immediate danger of perishing from a bursting of the intestinal canal within the abdomen, or else from a simple obstruction in the cavity of the bowels. This is not the case, when an artificial anus is formed, in consequence of a wound of the intestines, and, if the patient could receive timely succour, before such a consequence had completely taken place, possibly, the event might often be prevented.

Howsoever advantageous the formation of an artificial anus may be, in many cases, in which the patient's life depends upon the event, it must be confessed, that the consequence is a most afflicting and disgusting infirmity. It is true, however, that the matter, which is discharged, not having been long retained in the bowels, is not so fetid as that which is evacuated in the ordinary way; but, as the opening which gives vent to the matter is not endued with the same organization as the lower end of the rectum, and, as in particular, it is not furnished with any sphincter capable of contracting and relaxing itself, as occasion requires, the feces are continually escaping without any knowledge of the circumstance on the part of the patient. Some persons in this state, among the number of those whose histories are on record, have made use of a metal box, in which their excrement has been received. Schenckius relates the case of an officer, who was wounded in the belly, and who allowed his feces to escape into a vessel made for the purpose. Dionis makes mention of a similar case. What occurred to an invalid soldier, says this eminent writer, is too singular to serve as an example in practice, since nature alone preserved him, by making the wound of the abdomen serve as an opening for the discharge of his feces. The intestine has become adherent to it, and he daily evacuates his excrement through this opening. The matter coming away involuntarily, necessitates him to have a tin-box for its reception.

M. Moscati, principal surgeon of the hospital at Milan, has also communicated to the academy of surgery, an account of a wounded man, in whom an artificial anus took place, in consequence of a wound in the abdomen below the right hypochondrium. His excrement used also to be received in a tin-box, fastened to him by a belt. The above surgeon very properly remarks, as a truly singular circumstance in this wound, that it admitted of a leaden cannula being introduced, to which cannula the tin-box was accommodated. But, would the situation of wounds, liable to be followed by an artificial anus, be always sufficiently favourable, to allow of the intestinal matter being received in an appropriate vessel? May not the pressure, which the edges of such vessels are apt to make on the circumference of the opening, be detrimental? Lastly, would not such a vessel, though apparently fixed in a suitable manner, change its position, and sometimes allow the feces to escape on the patient's clothes?

Uncleanliness is not the only inconvenience of an artificial anus. Persons have been known to be quite debilitated by the affliction, and even ultimately to die in consequence of it. This is liable to happen, whenever the intestinal canal is opened very high up, so that aliment escapes before chylification is com-

pleted, and the nutritious part of the food has been taken up by the lacteals. But, when the opening only interests the lower circumvolutions of the ilium, or, what is more frequent, when it has occurred in the large intestines, the danger, to which the patient is exposed by this event, is rendered very trivial. There is no fact of this kind recorded, which had a fatal termination; on the contrary, many writers confirm, that such patients as they have seen with an artificial anus, have been healthy and well-looking.

The most grievous occurrence, to which persons with an artificial anus are exposed, is a prolapsus of the bowel, similar to what sometimes happens through the anus, with respect to the rectum. The descent of the bowel is sometimes simple, only affecting a portion of the intestinal canal just above or below the opening. On other occasions the complaint is double, the bowel both above and below the opening being prolapsed. This descent of the intestine forms a tumour, the dimensions of which vary considerably in the different subjects in whom it is observed. When the protrusion is caused by the upper part of the intestinal canal, the feces are voided at the extremity of the tumour, and, when the swelling consists of the lower portion of the bowel, the excrement is evacuated at the base of the prolapsed part.

When the tumour is double, it is easy to perceive, by observing this evacuation, to which end of the intestinal canal each protruded portion belongs. This consequence of an artificial anus is very serious, because it greatly increases the inconvenience, which the patient suffers. Sometimes, the tumour is exquisitely sensible; and, occasionally, when the eversion of the intestine is considerable, a strangulation is produced, which puts the patient's life in danger, unless such prompt assistance be afforded, as the nature of the case demands.

The business of the surgeon is to prevent, if possible, the formation of an artificial anus, as we shall see elsewhere; but, when the event has occurred, and, particularly, when the whole or the greater part of the stools are discharged in this way, no attempt can be made to stop up the opening without exposing the patient's life to the most alarming danger. Even when a considerable quantity of the feces is discharged in the natural manner, it is always to be presumed, that the bowel is considerably contracted at the place, where it communicates with the wound, and that the intestine will be very apt to inflame, when an unusual accumulation of its contents has taken place, unless they have an opportunity of escaping through the external opening. Such an occurrence would make the patient likely to die in a very short time.

But, if it is dangerous to close an artificial anus, when the case is of the most simple description, the thing is absolutely impracticable, when the affliction is complicated with an everted prolapsus of a part of the bowel; although we read in the Philosophical Transactions, that M. Le Cat undertook such an operation, in a case, in which there was an eversion of each portion of the intestinal canal.

But the pain which he gave the patient in endeavouring to reduce the protruded intestine, induced him to abandon all further attempts. If, also, in such a case, it were easy to reduce the displaced portions of intestine, and if that, which is connected with the rectum, were nearly of its natural diameter, (a circumstance not to be expected,) prudence would not allow us to place these portions opposite each other, for the sake of re-establishing the continuity of the canal. The number and depth of the adhesions, which the intestines may have contracted with each other, and the neighbouring parts, are likely to render such an operation impracticable. It would also be terrible to make an unsuccessful attempt of this kind, and to plunge into imminent peril, a person in other respects quite well, and who, with the exception of some inconvenience, may enjoy life as well as subjects of the best constitutions.

Though we cannot remedy such eversions of the intestine, as are brought on by an artificial anus, when the tumour is rather large, and of long standing; yet, there is a possibility of affording relief, when the swelling is small and recent. In this circumstance, skilful treatment would probably prevent the progress of the disorder, and even effect an entire cure. The treatment must obviously be very similar to that of the prolapsus ani, for both complaints are of the same nature. The practitioner should endeavour gently to return the tumour into the abdomen, and to retain it there by means of a soft pad of suitable size. This pad should be changed very frequently, on account of the matter discharged from the opening. As posture must greatly tend to bring about a cure, the patient should be recommended to lie down, as much as possible, on the side opposite the disease. He should be enjoined to make no violent exertion, which would put the abdominal muscles and diaphragm into action, and force the intestines through the external opening. If there be any difficulty in evacuating the feces from the artificial anus, the belly should be kept gently open. The parts in the vicinity of the artificial anus should be strengthened by slightly astringent fomentations,

&c. It might also be very useful to support the margin of the opening by an ivory or elastic-gum compress, if the patient should void feces of a thick consistence, and should feel, before the evacuation, the kind of inclination which precedes the discharge of the feces in the natural way.

Thus by advice, which is both simple and easy to follow, a grievous affliction may be prevented; and one which would expose the patient to the most pressing danger, were the swelling, to which the intestines protruded from an artificial anus are subject, to acquire such a size, that the bowels themselves become strangulated in the opening, through which they pass. (*Encyclopédie Méthodique; Partie Chirurgicale. Art. Anus contre Nature.*)

Mr. Lawrence has made a few very accurate remarks on the present subject, and he has also related some particulars of a case of artificial anus, which convey considerable instruction.

"If the complaint (a mortified hernia) terminates in the formation of an artificial anus, we must endeavour to alleviate those distressing inconveniences, which arise from the involuntary discharge of wind and feces through the new opening, by supplying the patient with an apparatus, in which these may be received, as they pass off. An instrument of this kind, the construction of which appears very perfect, is described by Richter (*Anfrangsgr. der Wundarzn, Vol. 5.*) from the *Traité des Bandages* of Juville. The patient will be best enabled to adapt any contrivance of this sort to the particular circumstances of his own case. It has been found, in some instances, that a common elastic truss, with a compress of lint under the pad, has been more serviceable than any complicated instrument (*Parisian Journal, Vol. 1. p. 193.*) in preventing the continual flow of feculent matter from the artificial opening." (*Treatise on Hernia, p. 206. First edition.*)

"I know," says Mr. Lawrence, "a patient with an artificial anus, in whom the gut often protrudes to the length of eight or ten inches, at the same time bleeding from its surface. This is attended with pain, and compels him to lie down; in which position the intestine recedes. The patient has now discharged all his feces at the groin for fifteen years; and has enjoyed tolerable health and strength during that time. His evacuations are generally fluid; but sometimes, of the natural consistence. Whenever he retains his urine, after feeling an inclination to void it, a quantity of clear inoffensive mucus, like the white of an egg, amounting to about four ounces, is expelled from the anus; and this may occur two or three times in the day." (*P. 208.*)

When the protruded intestine is strangulated, an operation may become necessary for the removal of the stricture. (*Schmucker Vermischte Chirurgische Schriften, Tom. 2.*) Two cases, which terminated fatally from this cause, are mentioned by Sabatier, in a memoir in the 5 Tom. de l'Acad. de Chir. Mr. Lawrence also refers to Le Blanc Précis d'Opérations, de Chir. Tom. 2. p. 445. We should always endeavour to prevent such protrusions, when a disposition to their formation seems to exist, by the use of a steel truss, which should, indeed, be worn by the patient independently of this circumstance. If the tumour has become irreducible by the hand, an attempt may be made to replace it by keeping up a constant pressure on the part, the patient being at the same time confined to bed. By these means, Desault (*Parisian Journal, Vol. 1. p. 178.*) returned a very large prolapsus, and, by pressure on the opening, the feces were made to pass entirely by the anus although, for four years, they had been voided only through the wound. (*Lawrence, p. 209, 210.*)

In cases of mortified hernia, the wound sometimes closes, except a small fistulous opening, which discharges a thin fluid, and cannot be healed. Mr. Lawrence has related, in his excellent treatise on hernia, a case, in which the feces came from the wound sometime after an operation, although the bowel did not appear gangrenous when this proceeding was adopted. (*P. 211.*)

In the appendix to this work, the author adds some further account of the case of artificial anus, which he has related (*P. 208.*) The man is sixty years of age, and appears to be healthy, active, and even younger, than he really is. He had had a scrotal hernia, which ended in mortification, and involved the testicle of the same side, and a large portion of the integuments, in the destruction. It is now nearly seventeen years since this event, and the feces have during all this time been discharged from the groin. He has never made use of a truss, nor taken any step, except that of always keeping a quantity of tow in his breeches.

The prolapsed portion of intestine varies in length and size at different times. It was four inches long when Mr. Lawrence saw it, and the basis, which is the largest part, measured nearly six inches in circumference. The prolapsus never recedes entirely, and it has occasionally protruded to the length of eight or ten inches, being as large as the forearm, and emitting blood. This occurrence is painful, and only comes on when the bowels are out of order. Warm fomentations,

and a recumbent position, afford relief, and accomplish a reduction of the bowel.

The projecting part is of an uniform red colour, similar to that of florid and healthy granulations. The surface, although wrinkled and irregular, is smooth, and lubricated by a mucus secretion. It feels firm and fleshy, and can be squeezed and handled, without exciting pain. The man has not the least power of retaining his stools. When these are fluid, they come away repeatedly in the course of the day, and with considerable force. When of a firmer consistence, there is only one stool, every one or two days, and the evacuation requires much straining. Such feces are not broader than the little finger. When the patient is purged, the food is often voided very little changed. This is particularly the case with cucumber. In this state he is always very weak. Ale is sometimes discharged five minutes after taken, being scarcely at all altered. The bowels are strongly affected by slight doses of purgatives. (*Lawrence, in Treatise on Hernia.*)

Consult *Sabatier in Mém. de l'Acad. de Chirurgie, Tom. 5, 4to. and in Médecine Opératoire, Tom. 2. L'Encyclopédie Méthodique, Partie Chirurg. Richter's Anfangsgr. der Wundarzn, Band 5. Parisian Chirurgical Journal. Œuvres Chirurg. de Desault par Bichat, Tom. 2. Schmucker's Chirurgische Schriften, Vol. 2. Lawrence's Treatise on Hernia.*

AORTA. Aneurisms of this vessel have already been treated of; but, there are a few other particulars, relating to this important artery, which seem to merit notice in a dictionary of surgery, and can only be conveniently mentioned in the present place.

WOUND OF THE AORTA NOT ALWAYS FOLLOWED BY INSTANTANEOUS DEATH.

A case, exemplifying this fact, has been lately recorded by M. Pelletan. In the month of May, 1802, a young military man, of middling strength, applied at the Hôtel-Dieu. In a duel, he had been run through with a foil, which penetrated above the right nipple, and came out at the left loin. The most alarming symptoms were apprehended; but, several days elapsed without any serious complaints taking place. The patient was bled twice, and kept on a very low regimen. Every thing went on quietly for a fortnight. He now complained of severe pains in his loins, and he was relieved by the warm bath. He seemed to be recovering, got up and went to walk in the garden allotted for the sick; but, the pain in his loins quickly returned, attended with difficulty of breathing, constipation, and wakefulness. He became very impatient and out of temper with the surgeons for not relieving him.

On the 15th of July, two months after the accident, a deformity of the spine was remarked about the eighth dorsal vertebra. The patient grew rapidly worse, and died in the utmost agony, saying that he felt suffocated, and tearing off his shirt that his chest might be free from the pressure of all kinds of clothing.

On the body being opened, the right side of the chest was found full of blood, coagulated in various degrees, and an opening, the diameter of which was equal to that of a writing pen, was detected in the aorta above the crura of the diaphragm. All the adjacent cellular substance was injected with blood, and three of the dorsal vertebræ were found carious. No mark of injury was perceptible in any of the thoracic or abdominal viscera. (See *Pelletan's Clinique Chirurgicale, Tom.* 1, *p.* 92—94.)

THICKENING AND CONSTRICTION OF THE AORTA.

Meckel met with two cases, in which the aorta was thickened and considerably constricted, just below its arch; yet, in both subjects, there was every reason to believe, that the abdominal viscera and lower extremities had been duly supplied with blood.

This fluid, which could only pass from the heart with great difficulty, and in small quantities, had, by regurgitating, lacerated the semilunar valves. (*Mém. de l'Acad. Royal. de Berlin*, 1756. *Obs.* 17 *and* 18.) A like example is recorded by Stoerk. (*Ann. Med.* 11. *p.* 171.)

OBLITERATION OF THE CAVITY OF THE AORTA.

It is observed, by Professor Scarpa, that the whole body may be regarded as an anastomosis of vessels, a vascular circle, and he contends, that this remark is so true, that even an obliteration of the aorta itself, immediately below its arch, may take place, without the general circulation of the blood in the body being stopped. Such a disease of the aorta was seen by M. Paris in the body of a woman. While she lived, the blood, which was expelled from the heart, was transmitted into the trunk of the aorta, below the constriction, and it got there by passing through the subclavian, axillary, and cervical arteries, into the mammary, intercostal, diaphragmatic, and epigastric arteries. From these latter arteries, the blood passed into the vessels of the thoracic and abdominal viscera, and those of the lower extremities. (See *Desault's Journal, Tom.* 2. *p.* 107.)

The very remarkable fact, that the circulation may be continued, even though the aorta is entirely obstructed, ought to make us considerably more confident in the success of operations, in which we are obliged to tie such arteries as the subclavian, and external iliac.

RUPTURE OF THE AORTA WITHIN THE PERICARDIUM.

The surgical writings of Scarpa, in relation to the formation of aneurisms, have now gained extensive celebrity in the world. It is well known, that this author maintains the doctrine, that, in all aneurisms, the internal and muscular coats of the artery are ruptured, and that the aneurismal sac is not formed of these tunics, but of the dilated cellular sheath, which surrounds the vessel. When a large aneurism bursts, there is always a double rupture; one of the artery; another of the aneurismal sac. The last is that, which is the immediate cause of the patient's destruction, by altering the *circumscribed* state of the aneurism into the *diffused*.

There are some exceptions, however, to the foregoing statement, and Scarpa has not failed to point them out. When the internal and muscular coats of the aorta are ruptured in a situation, where the outside of the vessel is only covered by a thin, tense, closely adherent membrane, such membrane may be ruptured at the same time with the proper coats of the artery, and sudden death be occasioned by the effusion of blood in the cavity of the thorax. These events are liable to happen, whenever the proper coats of the aorta are ruptured, within the pericardium, where the vessel is only covered by a thin layer reflected from this membranous bag. Walter has recorded one example of this kind, and Morgagni several others. A similar case is related by Scarpa. (See *Haller Disput. Chir. Tom. 5. Acta Medic. Berlin. Vol. 8. p. 86. Morgagni de Sed. et Causis Morb. Epist. 26. art. 7. 17. 21. Epist. 27. Art. 28. Scarpa on Aneurism, transl. by Wishart. p.* 81.)

STEATOMATOUS TUMOURS OF THE AORTA.

Two steatomatous tumours were noticed by Stenzel in the body of a male subject. They were situated in the substance of the membranes of the aorta, immediately below its arch. Notwithstanding these swellings rendered the vessel almost impervious, the man had the appearance of strength, and of having been well nourished. *Hæc corpora fere cor magnitudine æquabant ut omnem propemodum exeunti e sinistri cordis thalamo sanguini spatium præcluderent.* Dissert. de Steatomatibus Aortæ.

This is another striking fact illustrating the great power of the inosculations to carry on the circulation.

APHÆRESIS. (from ἀφαιρεω, to remove.) This term was formerly much used in the schools of surgery, to signify that part of the art, which consists in taking off any diseased, or preternatural, portion of the body.

APONEUROSIS. (ἀπο, from, and νευρον, a nerve.) The expression νευρον was applied by Hippocrates and other ancient writers to tendons and ligaments as well as nerves, all which parts seemed to resemble each other in having a white fibrous texture.

Matter very often collects under aponeuroses in different situations of the body, particularly, under the tendinous expansions, which cover the muscles of the thigh, the leg, and the forearm. Abscesses are also sometimes met with under the temporal, the palmar, and the plantar fasciæ; in the tendinous thecæ, which include the flexor tendons of the fingers; and, occasionally, also, in the aponeurotic sheath, in which the rectus abdominis muscle is situated.

One particular effect of an aponeurosis, or any kind of tendinous expansion, lying between a collection of matter and the skin, is materially to retard the progress of the pus towards the surface of the body. Hence, if the case be allowed to take its own course, the quantity of matter increases, the pus spreads extensively under the aponeurosis in every possible direction, separates the muscles from such fascia, and the muscles from each other, and the abscess does not burst till a vast deal of mischief has been produced, together with more or less sloughing of the fascia, tendons, &c. Such circumstances cannot happen, without a considerable degree of constitutional disturbance, and a permanent loss of the use of certain muscles. Even when a spontaneous opening is formed, and some of the matter escapes, it is often only a very imperfect discharge; for, the aperture generally occurs, not in a depending situation, nor over the main collection of pus, but, at a part, where the aponeurosis is most thin, and, consequently, where the matter had the least resistance to overcome in getting to the surface of the body.

The grand indication, in all such cases, is to make an early and a depending opening with a lancet, so as to prevent the extension of concealed mischief, and to let the matter escape as fast as it is formed. If a spontaneous opening should have occurred in an unfavourable place, a new aperture must be made in a proper situation; or if the former should be suffici-

ently depending and near the principal accumulation of matter, but too small, it must be rendered larger with a curved bistoury and a director. In every instance, in which an opening has been made, or enlarged, with a cutting instrument, it will be necessary to keep some lint between the lips of the incision, for the first few days, in order to prevent the part from healing up by the first intention. The lint must be occasionally taken out for the purpose of letting the matter flow out, and a fresh bit be afterwards introduced. Whenever any black dead pieces of fascia, or tendons, present themselves at the opening, they must be taken hold of with a pair of forceps and extracted.

APOSTEMA. (from αφιστημι, to recede.) An abscess.

APPARATUS. This implies the preparation, and arrangement of every thing necessary in the performance of an operation, or in the application of dressings. The apparatus varies according to circumstances. Instruments, machines, bandages, tapes, compresses, pledgets, dossils of lint, tents, &c. are parts of the apparatus, as well as any medicinal substances used.

It is a rule in surgery, to have the apparatus ready before beginning an operation. All preparations of this kind should not be made in the patient's room when the thing can be avoided, nor any where in his presence, as it would agitate him, and render him timid, and more restless in the operation.

APPARATUS MINOR; APPARATUS MAJOR; APPARATUS ALTUS. Three ways of cutting for the stone. (See *Lithotomy*.)

AQUA AMMONIÆ ACETATÆ. This is given in the dose of half an ounce in many surgical cases, in which the object is to keep up a gentle perspiration.

AQUA ARSENICATA.

℞ Arsenici in pulverem triti unc. ss.
Aquæ distillatæ lib. j.

These are to be boiled together in a flask till one fourth of the liquor is evaporated, and, when cold, filter the remainder through paper by means of a glass funnel. Has been applied to foul ulcers and cancers.

AQUA CALCIS. (LIQUOR CALCIS, L. P.) This is sometimes used as an astringent injection, or lotion, in cases of gonorrhæa, gleet, psora, tinea capitis, abscesses, &c.

AQUA CUPRI VITRIOLATI CAMPHORATA.

℞ Cupri vitriolati.
Boli Gallici sing. unc. ss.
Camphoræ drach. j.
Aquæ ferventis lib. iv.

Boiling water is to be added to the other ingredients, and the liquor filtered when cold. Is chiefly employed in a diluted state, as a collyrium; but it may also prove of service as an application to foul ulcers.

When used for the cure of the purulent ophthalmy, the lotion is to be injected under the eyelids by means of a blunt syringe, and, if necessary, the application may be repeated once or twice every hour. Some further particulars will be offered in the article *Ophthalmy*.

AQUA KALI. (LIQUOR POTASSÆ SUBCARBONATIS, L. P.) No adequate trial of this as an external application to ulcers or herpetic eruptions has yet been made; but, in the dose of 40 drops night and morning, Mr. Hunter thinks it cures some sores, resembling mild chancres, which were unaltered by the internal use of mercury and irritated by its use as a topic.

This remedy is principally deserving of notice on account of its having been given with a view of dissolving calculi in the bladder, so as to remove the necessity of performing the dangerous and painful operation of lithotomy. The principle, on which the aqua kali acts is by the alkali attracting and combining with the uric acid of the calculus. The medicine may be exhibited in doses of 20, or 40 drops, or of a dram, in a basin of gruel. Experience does not seem to justify the indulgence of much hope, with regard to the complete efficacy of the aqua kali in dissolving urinary calculi; but, there is no doubt, that it has often materially palliated the pain, which attends the presence of a stone in the bladder.

Some practitioners place more confidence in the aqua kali puri.

AQUA KALI ARSENICATI.

℞ Kali Arsenicati grana duo.
Aquæ Menthæ Sativæ uncias quatuor.
Spiritus Vinosi tenuioris unciam.
Misce et cola.

Two drams of this may be given thrice a day in cases of cancer. Mr. Barnes once shewed me a case of herpes of the nose, or noli me tangere, which was greatly benefited by this remedy externally applied. The patient was under Mr. Harvey, in St. Bartholomew's Hospital, and, at the time when I saw her, Mr. Barnes was using the lotion with double the proportion of arsenic. There are many ulcerations round the roots of the nails of the fingers and toes, to which many apply Plunket's caustic; but, the aquæ kali arsenicati would, in all probability, be quite as efficacious an application, and, certainly, it is a neater one.

AQUA KALI PURI. (LIQUOR POTASSÆ, L. P.) This has been given with a view of dissolving urinary calculi, in considerable doses, for a length of time. The trials, however, have not proved so successful as could have been wished, nor is the exhibition of so active a remedy unattended with disadvantageous conse-

quences to the system; for which reason, under the name of *mephitic alkaline water*, vegetable alkali supersaturated with fixed air, has of late been much substituted.

The proper dose, at first, is from ten to twenty drops, twice a day, in some linseed tea. At Saint Thomas's Hospital, the following is the way, in which the aqua kali puri is prescribed:

℞ Aquæ Kali puri ℥i.
Aquæ Distillatæ ℥ij. Misce. Dosis Drachma una bis die ex unciis quatuor infusi lini.

AQUA LITHARGYRI ACETATI. (LIQUOR PLUMBI ACETATIS, L. P.) Is extensively used largely diluted with water, as an application to inflamed parts. One dram to a quart of water is quite strong enough for common purposes. Mr. Justamond and Dr. Cheston used to apply it mixed with an equal proportion of a spirit resembling the tinctura ferri muriati, to the edges of cancerous sores.

The fear of the absorption of lead, has induced many practitioners to give up the use of this remedy, and have recourse to solutions of vitriolated zinc, which, it is said, answer equally well; but it is now rendered probable, from the experiments of Mr. Baynton, of Bristol, that cold water alone is of as much service as either in removing inflammation. (See *Pharmacopœia Chirurgica.*)

AQUA PICIS. May be applied to tinea capitis. There are ulcers on the legs, surrounded with a scorbutic redness, and pimples, covering a large extent of the skin. In such instances, the aqua picis, used as an application round the limb, over the dressings, is of great service.

AQUEOUS HUMOUR OF THE EYE. The proposal of letting out this fluid, and the circumstances, in which such an operation may be proper, will be considered in the article *Opthalmy.*

ARDOR URINÆ. Difficulty and pain in making water, attended with a sense of heat in the urethra, a symptom of gonorrhea, and some other affections.

ARGEMA, or ARGEMON. (from αργος, white.) A small white ulcer of the globe of the eye. (See *Cornea, ulcers of.*)

ARGENTI NITRAS. (*Nitrate of silver, lunar caustic.*) Is the best of the mildest caustics. Its utility for stimulating indolent ulcers, and keeping granulations from rising too high, is known to every one.

Mr. Hunter recommends the use of the argentum nitratum, on the first appearance of a chancre, before absorption can be supposed to have taken place. He directs the caustic to be scraped to a point, like a blacklead pencil; so that, when it is applied, every part of the surface of the chancre may come into contact with it; and he advises the repetition of this process, till the last slough, which is thrown off, leaves the sore florid and healthy. (*Hunter on the Venereal.*)

From this treatment, there is a chance, that the constitution will not be infected; but it is generally prudent, notwithstanding, to give the pil. hydrargyri.

The important use of the argentum nitratum, in the cure of numerous diseases, we shall have occasion to remark in various places of this work; particularly when we come to the article *Urethra, strictures of*, in the removal of which disease it is peculiarly useful.

The argentum nitratum is often used in the form of a solution, in the proportion of a dram of the caustic to an ounce of distilled water. In general this application ought to be at first more or less weakened, by the addition of a quantity of distilled water. Cancerous ulcers, and sores about the nose and neighbouring parts of the face, commonly going under the denomination of *noli me tangere*, are often considerably benefited by the argentum nitratum, both in the solid and fluid state. The solution agrees very well with certain sores, which occur round the roots of the nails of the fingers and toes. The lotion is sometimes applied with a camel-hair-pencil; in general, however, by dipping little soft bits of lint in the fluid, laying them on the part, and covering them with a pledget.

ARNICA. (αρνικη, from αρν, a lamb). *Leopardsbane.*

Amaurosis is the principal case in which surgeons now ever employ this medicine. From a dram to half an ounce of the flowers may be infused in a pint of water, and this may be taken in the course of four and twenty hours. Arnica, thus exhibited, sometimes produces vomiting, profuse perspiration, and an increased secretion from the kidneys. At other times, no evident effects of this sort arise. The virtues of this medicine have undoubtedly been exaggerated, though no one can question that, as it is a powerful one, the trial of it should still be continued.

ARSENIC. (from the Arabic *Arsanek*, or αρσην, *masculus*, from the strength of its qualities.) Every one is acquainted with the deleterious effects of this mineral, which, in the dose of a few grains, acts as the most violent poison. Notwithstanding such effects which are generally dreaded, practitioners have ventured to employ arsenic as a remedy for diseases, and this has sometimes been done with success, not only as an external topical application, but, even as an internal medicine.

Arsenic is the principal ingredient of a secret remedy, which, in Ireland, has long possessed very great celebrity for the cure of cancer, and which is known by the name of Plunket's caustic. This ap-

plication is said to consist of the ranunculus acris, the greater crow-foot, the flammula vulgaris, and the lesser crow-foot: an ounce of each is to be bruised, and added to a dram of arsenic, and five scruples of sulphur. The whole is to be beaten into a paste, formed into balls, and dried in the sun. When used, they are to be beaten up with the yolk of an egg, and applied on a piece of pig's bladder. The use of the ranunculus is to destroy the cuticle, on which the arsenic does not act. The application is to remain on twenty-four hours, and the slough is to be afterwards dressed with any simple, unirritating ointment. Arsenic seems to have been first recommended as an external application to cancers, and it was generally combined with opium. It certainly sometimes produces a salutary change in the appearance of the sore. We have reason to regret, that this change is usually not of permanent continuance. Besides Plunket's remedy, various other preparations of arsenic have been externally employed.

Mr. Justamond's applications to cancer, originally suggested by a receipt, said to be preserved in the Earl of Arundel's family, were somewhat varied. They were generally combinations of arsenic and sulphur. The above receipt directs an ounce of yellow arsenic, with half that quantity of armenian bole, and sometimes as much red precipitate. Mr. Justamond also employed a sulphuret of arsenic, and a combination of this sulphuret with crude antimony. The arsenical preparation, preferred, was scraped and laid on the middle of the sore, while its edges were moistened with a combination of muriated iron, and sal ammoniac. The effects were, the correction of the fetid smell, melioration of the appearance of the sore, and separation of the cancerous part.

In the Pharmacopœia Chirurgica, Mr. Justamond's arsenical caustic is directed to be made in the following manner: ℞ antimonii pulverizati ℥ij. arsenici pulverizati ℥j. These are to be melted together in a crucible. The application may be reduced to any degree of mildness by the addition of powdered opium. The latter ingredient may also act specifically in diminishing the pain. M. Febure's remedy consisted of ten grains of arsenic, dissolved in a pint of water, with an ounce of the extract of cicuta, three ounces of Goulard's extract, and a dram of laudanum. With this fluid the cancer was washed every morning. He gave also arsenic internally, and directs two grains to be dissolved in a pint of water, to which must be added syrup of chicory, with half an ounce of rhubarb. A tablespoonful is to be given night and morning, with half a dram of the syrup of poppies. It may be remarked, that the dose of the arsenic, in this preparation, is one twelfth of a grain.

The kali arsenicatum is an excellent preparation for internal exhibition, and is thus made:

℞ Arsenici Albi, Nitri Purificati, singulorum unciam:

Crucibulo amplo igne candenti injice nitrum, et liquefacto adde gradatim arsenicum in frustulis, donec vapores nitrosi oriri cessaverint. Solve materiam, in aquæ distillatæ libris quatuor, et post idoneam evaporationem sepone, ut fiant crystalli.

Dosis, Grani pars decima ter quotidie.

It may be given in the following way.

℞ Kali arsenicati gr. ij.
Aq. Menthæ Sativæ ℥iv.
Spirit. Vinosi tenuioris ℥j. M. et cola.
Dosis drachmæ duæ ter quotidie.

The following is Dr. Fowler's method of preparing arsenic for internal use. Take of powdered arsenic, and prepared kali, each sixty-four grains; boil them gently in a Florentine flask, or other glass vessel, with half a pound of distilled water, until the arsenic is dissolved. To this solution, when cold, add half an ounce of the compound spirit of lavender, and as much water as will make the whole equal to a pint, or fifteen ounces and a half in weight. The dose of this solution is as follows: From two years old to four, gutt. ij or iij to v; from five to seven, gutt. v to vij; from eight to twelve, gutt. vij to x; from thirteen to eighteen, gutt. x to xii; from eighteen upwards, gutt. xij.

These doses may be repeated once in eight or twelve hours, diluted with thick gruel or barley-water.

It will only be in my power to specify here a few of the numerous surgical cases, in which the internal employment of arsenic has been proposed. The following are particularly worthy of attention: tetanic affections; cancer; noli me tangere; elephantiasis; numerous unnamed malignant ulcers; several obstinate cutaneous diseases; pseudo-syphilis, and those sequelæ of the venereal disease, which cannot be subdued by mercury, &c.

Arsenic has also been recommended for the prevention of hydrophobia by Dr. J. Hunter. (See *Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol.* 1.) Subsequent trials of this medicine, however, in such cases, do not seem to entitle it to much confidence. After the symptoms have begun, arsenic decidedly has no power in arresting the disease. It was lately tried by Dr. Marcet. Three drops of Fowler's solution were ordered to be taken, every other hour, in two drams of peppermint or water, with half a dram of syrup. However, no relief whatever seemed to be derived from the medicine. (See *Medico-*

Chirurgical Transactions, Vol. 1, *p.* 141—156.)

But, although arsenic has hitherto failed in producing benefit in cases of hydrophobia, some facts have been recently published by Mr. Ireland, surgeon to the 4th Battalion of the 60th Regiment, which make it appear a truly valuable and efficacious remedy for counteracting the poison of serpents. (See *Medico-Chirurgical Transactions, Vol.* 2, *p.* 393, *and the article, Wounds—Bite of the Viper, in this Dictionary.*)

Surgeons are frequently desired to examine the bodies of persons, suspected of having been poisoned with arsenic, and every practitioner should qualify himself to judge whether the suspicion is rightly formed, or not. Often, indeed, the life of the person, supposed to have administered the poison, will entirely depend upon the nature of the medical evidence. Besides, in certain cases, the symptoms, which precede a natural death, are of such a description, as to create strong suspicions that the patient has died of poison, when the fact is otherwise. Hence, it must be plain, that, both with respect to the question of murder, and of suicide, the evidence of the surgeon will frequently be of the utmost importance.

The symptoms and effects of arsenic, when taken into the stomach, ought to be well remembered. A pricking and burning sensation will soon be experienced in this organ. Sudden and excruciating pains will be felt in the bowels. A severe vomiting will arise. The tongue, mouth, and throat, will become rough, and parched, and an unquenchable thirst will prevail, with much anxiety and restlessness. When the dose of arsenic has been considerable, and proper antidotes have not been employed in time, an inflammation of the stomach and intestines will be the consequence, and it sometimes terminates in gangrene. Distention of the abdomen, coldness of the extremities, slow feeble pulse, fetid vomiting and stools, hiccough, and, lastly, death, ensue. In one instance of death from arsenic, related by Dr. Yelloly, not the least mark of pain, or tenderness, in the abdomen, was perceptible while the patient lived. (See *Edinb. Med. and Surgical Journal, Vol.* 5, *p.* 391.)

When the body of a person, who has been poisoned with arsenic, is opened, the small intestines will generally be found to be inflamed and thickened, their external surface being in some places of a florid red colour, and in others, of a purple hue; while here and there effusions of coagulating lymph may be observed. The large intestines in general seem to suffer less, though, in some cases, they are found more or less inflamed as far as the extremity of the rectum. Sometimes, the bowels are even quite mortified in various places.

The villous coat of the stomach is considerably inflamed, and points of extravasated blood may commonly be noticed upon it. In one case, examined by Dr. Yelloly, there were observed two, or three circular spots, of the size of a shilling, which were abrasions of the membrane. In some places, the villous coat seemed to be thickened by an effusion of lymph.

The convolutions of the intestines will often be found connected together by adhesions. The lining of the œsophagus will also sometimes partake of the inflammation.

Very violent and even fatal effects may also arise from the absorption of arsenic from the skin into the circulation. (See *Med. and Physical Journal, Vol.* 5, *p.* 543.)

There are five methods of detecting the presence of arsenic. First, by precipitating this mineral from any fluid, in which it is dissolved, by an alkaline hydro-sulphuret. Secondly, by precipitating any solution of arsenic by the sulphate of copper. Thirdly, by reducing the oxide into the metallic state, by heating it with extraneous substances in a glass-tube. Fourthly, by observing the effect, which arsenic has, in whitening copper, when heated in contact with it. Fifthly, by perceiving the peculiar odour, which is exhaled, when arsenic is evaporated from a heated surface.

When some of the solution of sulphuret of potash (kali sulphuratum) is added to a solution of the white oxide of arsenic, a precipitate is instantly formed of a bright orange colour.

All surgeons, however, should be aware, that a very similar effect is produced by adding the solution of kali sulphuratum to a solution of tartarised antimony; but, the precipitate is not formed so readily as when arsenic is concerned.

The second means of ascertaining the presence of arsenic is by precipitating a mixed solution of the white oxide of this metal and potash, by adding some of the solution of the sulphate of copper, (Cuprum vitriolatum). The precipitate, formed by this process, is of a beautiful green colour, and is well known by the name of Scheele's green paint. In order to produce such precipitate in the best way, Dr. Bostock recommends, that the proportions of the oxide of arsenic, potash, and sulphate of copper, be to each other, as one, three, and five. (*Edinb. Med. and Surgical Journal, Vol.* 5, *p.* 169.)

The third method of detecting arsenic consists in reducing the oxide into the metallic state, by mixing the suspected powder with a little charcoal, putting these substances into a glass tube, and exposing them for a full quarter of an

hour to a red heat. One end of the tube should be hermetically closed, the other stopped with a plug of clay. The glass must also be every where well coated with clay and sand, be about a quarter of an inch in diameter, and eight inches in length. On the application of caloric, the oxygen of the arsenic unites with the carbon, and forms carbonic acid gas, leaving the arsenic on the inside of the glass tube reduced to the metallic state. This is reckoned the most decisive test of the presence of arsenic; but, it will not answer when the quantity of the latter mineral is less than a grain.

The quality, which arsenic has, of uniting with copper and forming a white compound, is the fourth means of detecting the presence of the first of these metals. For this purpose, put one grain of suspected powder, with half a grain of powdered charcoal, and two drops of oil, between two plates of polished copper, which are to be bound together with some wire, and exposed, for some time, to a red heat.

Dr. Bostock has explained, that, when a paste of charcoal and oil alone is put between plates of copper, and exposed to heat, a somewhat similar white appearance is produced on them, so that the communication of a white colour to copper by arsenic is not the most eligible criterion, particularly, when the quantity of the suspected substance is small.

The fifth mode of judging of the presence of arsenic is by the low, bluish, white, flame, alliaceous smell, and white smoke, which arise when that mineral is thrown on a red hot body. This experiment will only afford information, to be depended upon, when the quantity of arsenic is considerable, and it is unmixed with other substances.

Of all the foregoing modes, Dr. Bostock deems that, in which the green precipitate is produced with the sulphate of copper, the most convenient, delicate, and decisive.

Of late, a new test of arsenic has been suggested. The following is the account given of it by Dr. P. M. Roget: "Let the fluid, suspected to contain arsenic, be filtered: let the end of a glass rod, wetted with a solution of pure ammonia, be brought into contact with this fluid; and let a clean rod, similarly wetted with a solution of nitrate of silver, be brought into contact with the mixture. If the minutest quantity of arsenic be present, a precipitate of a bright yellow colour, inclining to orange, will appear at the point of contact, and will readily subside to the bottom of the vessel.—(Note. As this precipitate is soluble in ammonia, particular care should be taken to avoid adding it in excess; indeed, the quantity of either ammonia or nitrate of silver employed, can scarcely be too small for the purpose of detecting the presence of arsenic.)

"In examining the circumstances, attending the agency of this test, the following particulars were observed. On adding successively ammonia and nitrate of silver to distilled water, no precipitation takes place. Fowler's arsenical solution affords a precipitate of a yellow colour, similar in appearance to that produced by a solution of the white oxyd; but, a solution of arsenic acid gives a precipitate of a red brick colour. The fixed alkalies, when substituted for ammonia, likewise produce a yellow precipitate; but, the results are less distinct, since, in the circumstances, in which the experiment is made, they decompose the nitrate of silver, an effect, which ammonia does not produce. We found, by comparative experiments, that the precipitates, thrown down by the same reagents, (namely, ammonia and nitrate of silver,) when either zinc, iron, copper, mercury, or lead was contained in the fluid, had an appearance totally different from that produced by arsenic; and that the latter could readily be detected by the same means, notwithstanding the presence of these metals. The salts of copper, or lead, when previously mixed with a solution containing arsenic, occasioned no difference in the results. With a solution of oxymuriate of mercury, ammonia alone will occasion a white precipitate; but, if arsenic be also present, on addition of nitrate of silver the precipitate immediately acquires a yellow colour. The efficacy of this compound test is not weakened, but, on the contrary, seems to be rather increased by the presence of sulphate of iron. Sulphate of zinc was not found to interfere with its operation, any otherwise than requiring a larger quantity of ammonia, in order to saturate the sulphuric acid; but, when this has been effected, and the whole of the zinc precipitated, the addition of nitrate of silver produces the same yellow tint as in the other experiments. There is, therefore, reason to presume, that no admixture of metallic, or other salts, will occasion ambiguity, or enable the arsenic to escape detection, when the above test is properly applied. (Dr. Roget observes, in a note, that in the Philosophical Magazine, for 1809, Mr. Hume has proposed boiling the suspected matter with a solution of carbonate of potash, and bringing into contact with it a stick of dry nitrate of silver; a method, somewhat analogous to that above described, but, much less convenient in its practical application.)

"Being curious to determine the limit of minuteness in the quantity of arsenic, discoverable by this test, we dissolved a

grain of white arsenic in a known quantity of distilled water, and, by successive additions of water to determinate portions of this solution, prepared other solutions, containing respectively one 2000th, one 20,000th, and one 200,000th of their weight of arsenic. By applying the test to a small quantity in a watch-glass, we found, that, when it contained only one 25,000th of a grain of arsenic, the precipitate was of a bright yellow colour. It was still distinctly yellow, when the quantity of arsenic was reduced by dilution to one 50,000th of a grain. When further diluted, the yellowness was gradually less and less discernible, and the precipitate appeared of a light blue. It retained this colour, until its quantity became too minute for observation. A bluish cloud, however, was very distinctly visible, when the fluid examined contained only the 250,000th part of a grain of arsenic.

"If, (says Dr. Roget) along with the extraordinary degree of delicacy of this test, we take into consideration the extreme facility of applying it, and the greater convenience of operating upon fluids, than upon solid bodies, as we are obliged to do, when we have recourse to the usual methods, it appears decidedly entitled to preference." (See *Medico Chirurgical Transactions*, *Vol.* 2, *p.* 156—160.)

The following plan should be pursued, when arsenic has been swallowed in such a quantity as to endanger life. An emetic of white or blue vitriol should be exhibited immediately, and large quantities of water swallowed, in which the liver of sulphur (kali sulphuratum) is dissolved. The stomach having been thus emptied, a mixture, containing the kali sulphuratum, about a scruple to a dose, should be frequently exhibited, milk, butter, or castor oil, being freely given in the intervals.

The employment of copious blood-letting, in cases of poison from arsenic, was suggested by Dr. Yelloly, on the principle of removing inflammation. "Analogy (says he) seems to indicate its employment; but, its particular fitness can only be determined by experience." (*Edinburgh Medical and Surgical Journal*, *Vol.* 5, *p.* 393.) Dr. Roget has put this proposal to the test of experiment, and the recovery, which was effected by that gentleman, after a large quantity of arsenic had been swallowed, and most alarming symptoms had come on, seems to be much in confirmation of the utility of the practice. (See *Medico-Chirurgical Transactions*, *Vol.* 2, *p.* 136.)

This article would admit of being considerably lengthened; but, as some of the subject is as much medical as surgical, I think it will be sufficient in this work to refer the reader to sources, from which more extensive information may be obtained. (See *Observations on the different Methods recommended for detecting minute Portions of Arsenic, by John Bostock, M. D. Edinb. Med. and Surgical Journal*, *Vol.* 5, *p.* 166, *also p.* 14. *Dissertatio Inauguralis de Effectibus Arsenici in varios organismos necnon de indiciis quibusdam veneficii ab Arsenico illati; quam præside C. F. Kielmayer publice defendet, Jan.* 1808. *Auctor Georg. Fried. Jaeger, Stuttgardianus, 8vo. Tubrisgæ. in Nouvelles Experiences sur les Contre-poisons de l'Arsenic, par Casimir Renault, Paris an. IX. Murray's System of Chemistry*, *Vol.* 3, *p.* 356, *Edit.* 2. *Observations on the Use of Arsenic, by G. N. Hill, in Edinburgh Med. and Surgical Journal*, *Vol.* 5, *p.* 19—312. *Pharmacopœia Chirurgica. Medico-Chirurgical Transactions*, *Vol.* 1, *p.* 141, *Vol.* 2, *p.* 136, 156, *and* 393, *&c.*

ARTERIOTOMY. (from αρτηρια, an artery, and τεμνω, to cut.) The operation of opening an artery, for the purpose of taking away blood for the relief of diseases. (See *Bleeding.*)

ARTERIES, *Wounded.* (See *Hemorrhage.*)

ARTICULATIONS, *Diseases of.* (See *Joints.*)

ASTRINGENTS. (from *astringo*, to bind.) In medicine, are those substances which possess a power of making the living fibres become contracted, condensed, and corrugated. They are employed in the practice of surgery chiefly as external applications, either for restoring diminished tonic power, or checking various discharges. They are also deemed very eligible local remedies for phlegmonous inflammation.

ATHEROMA. (from αθηρα, pap.) An encysted tumour, so named from its paplike contents. (See *Tumours, Encysted.*)

AXILLARY ARTERY, *Wounded.*—When, in a case of this description, it is necessary to tie the injured vessel, Scarpa believes, that nothing tends more to embarrass the surgeon, than an injudicious smallness of the first incision through the skin and such other parts as conceal the wound in the artery. An assistant must compress the vessel, from above the clavicle, as it passes over the first rib. When the weapon has penetrated, from below upward, directly into the axilla, the surgeon is to make a free dilatation of the wound upon a director, or his finger. This must be done to a sufficient height to expose a considerable portion of the artery, and the precise situation of the wound in it.

When the weapon has pierced obliquely, or from above downwards, through a portion of the great pectoral muscle, into the axilla, Scarpa advises the surgeon to cut through the lower edge of this muscle,

and enlarge the wound, on a director, or his finger, so as to bring fairly into view the injured part of the artery. The thoracic arteries, divided in this operation, must be immediately tied. The clots of blood are then to be removed, and the bottom of the wound cleaned with a sponge, by which means the opening in the axillary artery will be more clearly seen. As this vessel lies imbedded in the brachial plexus of nerves, the surgeon must take care to raise it from these latter parts with a pair of forceps, before he ties it. Two ligatures will be required; one, above, the other below the wound of the artery.

B.

BALSAMUM COPAIVÆ. Exhibited by surgeons principally in cases of gonorrhea, gleet, and piles. A dram may be given thrice a day.

BALSAMUM PERUVIANUM CUM FELLE BOVINO. ℞ Fellis Bovini ʒiij Balsami Peruv. ʒj M. Dr. H. Smith has advised this application to be occasionally dropped into the ear, when there is a fetid discharge from it. The meatus auditorius externus is also to be washed out every day, by syringing the passage with water, to which some recommend soap to be added.

BANDAGE. (*Deligatio. Fascia.*) An apparatus, consisting of one or several pieces of linen, or flannel, and intended for covering, or surrounding parts of the body for surgical purposes.

The use of bandages is to keep such compresses, remedies, &c. in their proper situation, as are applied to any particular part; to compress blood-vessels, so as to restrain hemorrhage; to rectify certain deformities by holding the deranged parts in a natural position; and to unite parts, in which there is a solution of continuity.

As the application of bandages is a very important branch of surgery, authors have not neglected it. Much has been written on the subject, and almost every writer has devised new bandages, perhaps without much benefit to surgery. Unfortunately, it is next to impossible to give very clear ideas of the numerous sorts of bandages by description. The surgeon can only acquire all the necessary instruction and information from the experience and habit resulting from practice. Hence, we shall confine ourselves to a general account of the subject.

Bandages should be made of such materials as possess sufficient strength to fulfil the end proposed in applying them, and they should, at the same time, be supple enough to become accommodated to the parts to which they are applied.

Bandages are made of linen, cotton, or flannel. If possible, they should be without a seam, and linen is woven for this purpose; but the selvage is always harsh, and, as the edges are necessarily covered by the next round, they are sometimes inconvenient. Most surgeons prefer, therefore, old linen, and more readily submit to the inconvenience of the edges unravelling, than to the irregularity which any stitching would produce.

There are cases, in which the bandage should have a degree of firmness, that does not belong to the materials usually made use of. This circumstance is obvious in cases of hernia, and in all those in which there is occasion for elastic bandages. As we have already observed, linen, flannel, and cotton (calico), are the common materials. The first employment of flannel bandages is imputed to the Scotch surgeons, who preferred them to linen ones, in consequence of their being better calculated for absorbing moisture, while, being more elastic, they yield in a greater degree in cases requiring this property; as in the swelling subsequent to dislocations, fractures, &c. It has been asserted, that linen is better than flannel, because more cleanly; but neither one nor the other will continue clean, unless care be taken to change it very often.

The employment of cotton or calico bandages is a more recent method, and many advantages are attributed to the softness and elasticity of this material.

In applying a bandage, care must be taken, that it be put on tight enough to fulfil the object in view, without running any risk of stopping the circulation, or doing harm in any other way. If it be not sufficiently tight to support the parts in a proper manner, it is useless; if it be too tense, it will produce swelling, inflammation, and even mortification.

To apply a roller skilfully, the part which it is to cover, must be put in its proper situation; the head of the roller held in the surgeon's hand, and only so much unrolled as is requisite for covering the part.

In general the bandage should, if possible, be applied in such a manner as will admit of its being removed with the most ease, and allow the state of the parts beneath to be examined, as often as occasion requires.

For this reason, in fractures of the leg and thigh, the eighteen-tailed bandage is

generally preferred to a simple roller. The former may be loosened and tightened, at pleasure, without occasioning the smallest disturbance of the affected limb; a thing which could not be done, were a common roller to be employed.

As soon as a bandage has fulfilled the object for which it is applied, and it has become useless, its employment should be discontinued; for, by remaining too long on parts, it may obstruct the circulation, diminish the tone of the compressed fibres, and vessels, and thus do harm.

Bandages are either *simple* or *compound*. They are also sometimes divided into *general* and *particular*. The latter often derive their names from the parts, to which they are usually applied.

A simple bandage is a long piece of linen or cotton, of an indefinite length, and from three to six inches in breadth. When about to be applied, it is commonly rolled up, and the rolled part is termed its *head*. When rolled up from each end, it is called a *double-headed roller* or *bandage*.

The chief of the simple bandages are the *circular*, the *spiral*, the *uniting*, the *retaining*, the *expellent*, and the *creeping*.

The *circular* bandage is the simplest; the rolls cover each other, and it is seldom long, as two or three turns are generally enough.

The *spiral* bandage is the most frequently used of all; for, it is this which we see in such common employment on the limbs, in cases of ulcers, &c. In applying a common roller to the whole of a limb, the bandage must be carried round the part spirally, or else it is obvious that the whole member could never be covered. When the leg is the part, the surgeon is to begin by surrounding the foot with a few turns. Then carrying the head of the bandage over the instep, he is to convey it backward, so as to make the bandage unroll, and apply itself just above the heel. The roller may next be brought over the inner ankle; thence again over the instep, and under the sole; and the surgeon then brings the bandage spirally upward once more to the outer part of the leg. After this, every circle of the roller is to be applied, so as to ascend up the limb in a gradual, spiral form, and so as to cover about one third of the turn of the roller immediately below. The increasing and diminishing diameter of the limb, is one great cause, which brings into view the unskilfulness of a surgeon in this common operation; for, it prevents the roller from lying smoothly, although spirally applied, unless a particular artifice be dexterously adopted. The plan alluded to, is to double back the part of the roller that would not be even, were the application to be continued in the common spiral way, without this manœuvre. When the bulk of the limb increases very suddenly, it is sometimes necessary to fold, or, as it is termed, *reverse*, every circle of the bandage in the above manner, in order to make it lie evenly on the limb. It is manifest, that the pressure of the roller will be greatest where the duplicatures are situated, and hence, when it is an object to compress any particular part, the surgeon should contrive to reverse the turns of the bandage just over the situation where most pressure is desirable.

When a roller is to be applied to the forearm, it is best to make the few first turns of the bandage round the hand.

Care must be taken not to make the bandage very tight, if it be intended to wet it afterwards with any lotion; for, it is always rendered still more tense by moisture.

Mr. John Bell describes the principal purposes for which a roller is employed, as follows: "Although in recent wounds, it is with plasters and sutures that we unite the parts point to point, yet it is with the bandage that we support the limb, preserve the parts in continual and perfect contact with each other, and prevent any strain upon the sutures, with which the parts are immediately joined, and we often unite parts by the bandage alone. (This is called the *Uniting Bandage*, and will be presently described.) But it is particularly to be observed, that in gun-shot wounds, and other bruised wounds, though it would be imprudent to sew the parts, since it is impossible that they should altogether unite, yet the gentle and general support which we give by a compress and bandage, prevents them from separating far from each other, unites the deep parts early, and lessens the extent of that surface, which must naturally fall into suppuration.

"In the hemorrhagy of wounds, we cannot always find the artery; we dare not always cut parts for fear of greater dangers; we are often alarmed with bleedings from uncertain vessels, &c. or from veins as well as arteries: these hemorrhages are to be suppressed by the compress; which compress, or even the sponge itself, is but an instrument of compression, serving to give the bandage its perfect effect. Frequently, in bleedings near the groin, or the arm-pit, or the angle of the jaw, wherever the bleeding is rapid, the vessels uncertain, the cavity deep, and the blood not to be commanded by a tourniquet, and where the circumstances forbid a deliberate and sure operation, we trust to compress and bandage alone.

"Bandage is very powerful in suppressing bleeding. At one period of sur-

gery, it took place of every other method, &c. If a compress be neatly put upon the bleeding arteries, if there be a bone to resist the compress, or even if the soft parts be firm below, and the bandage be well rolled, the patient is almost secure. But such a roller must be rolled smoothly from the very extremity of the fingers or toes; the member must be thoroughly supported in all its lower parts, that it may bear the pressure above. It is partial stricture alone that does harm, creates intolerable pain and anxiety, or brings on gangrene. Hemorrhagy requires a very powerful compression, which must therefore be very general, &c. It must not be made only over the bleeding arteries, which is all that the surgeon thinks of in general, &c.

"In abscesses, where matter is working downwards along the limb, seeking out, as it were, the weak parts, undermining the skin, and wasting it, insulating and surrounding the muscles, and penetrating to the bones, the bandage does every thing. The expelling bandage, the propelling bandage, the defensive bandage, were among the names, which the older surgeons gave to the roller, when it was applied for these particular purposes; and these are properties of the roller, which should not be forgotten." (*Principles of Surgery, Vol.* 1.)

Soon after this description of some of the chief surgical uses of the roller, Mr. John Bell proceeds to explain, in what manner this most simple of all bandages may be put on a limb.

"Practice will convince you, that the firmness and neatness of a bandage depend altogether upon these two points; first, upon the turns succeeding each other in a regular proportion; and, secondly, upon making reverses, wherever you find any slackness likely to arise from the varying form of the limb. Thus, in rolling from the foot to the ankle, leg, and knee, you must take care, first, that the turns, or, as the French call them, *doloires*, of the roller lie over one another by just one third of the breadth of the bandage; and, secondly, that at every difficult part, as over a joint, you turn the roller in your hand, make an angle, and lay the roller upon the limb, with the opposite flat side towards it; you must turn the bandage so as to reverse it, making, what the French call, a *renversée* of the roller at the ankle, at the calf of the leg, and at the knee. You must be careful to roll your bandage from below upwards, and support the whole limb by a general pressure. That you may be able to support the diseased part with a particular pressure, you must lay compresses upon the hollows and upon the bed of each particular abscess, and change the place of these compresses from time to time, so as now to prevent matter sinking into a particular hollow, now to press it out from a place where it is already lodged, and again to reunite the surface of an abscess already completely formed, from which the matter has been discharged." (*Principles of Surgery, Vol.* 1.)

In the article *Joints*, we have taken notice of the good effects of the pressure of a roller in the cure of white-swellings. Here we shall just introduce Mr. John Bell's sentiments upon the subject: "In a diseased bursa, as in a relaxation of the knee-joint, that disease, which, with but a little indulgence, a very little encouragement of fomentations, poultices, bleeding, and low diet, would end in white-swelling of the knee; may be stopped even by so simple a matter as a well-rolled bandage. (*Vol.* 1, *p.* 127.)

The *uniting bandage*, or *spica descendens*, used in rectilinear wounds, consists of a double-headed roller, with a longitudinal slit in the middle, of three or four inches long. The roller, having one head passed through the slit, enables the surgeon to draw the lips of the wound together. The whole must be managed, so that the bandage may act equally. When the wounds are stitched, this bandage supports the stitches, and prevents their tearing through the skin. When the wound is deep, writers advise a compress to be applied on each side, in order to press the deeper part of its sides together. When the wound is very long, two or three bandages should be employed, and great care must be taken, that the pressure is perfectly equable.

Henkel and Richter recommend a uniting bandage, which allows the surgeon to see the wound, over which only narrow tapes cross. The reader, if he should ever wish to employ this contrivance, may read a description of it in Rees's Cyclopædia, or Motherby's Medical Dictionary, though I confess I could not understand it from the description in those works, until I looked at the plate in Richter's Anfangsgr. der Wundarzn. Band 1.

When we make use of a single-headed roller, as a *retentive bandage* only, we should always remember to begin the application of it on the side opposite the wound. The obvious reason for so doing is to prevent a farther separation of the lips of the wound, as the contrary manner of applying the roller would tend directly to divide them. (*Gooch, Vol.* 1, *p.* 143.)

The intention of the *expellent bandage* is to keep the discharge sufficiently near the orifice of the wound to prevent the formation of sinuses. In general, a compress of unequal thickness is necessary; the thinner part of the compress being

placed next, and immediately contiguous to, the orifice of the wound; the thicker part below. Before the bandage is applied, the pus must be completely pressed out, and the rolling begin with two, or three, circular turns on the lower part of the compress. The bandage must then be carried spirally upwards, but not quite so tightly, as below. It is afterwards to be rolled downward to the place, where it began.

The *creeping* is a simple bandage, every succeeding turn of which only just covers the edge of the preceding one. It is employed in cases, in which the object is merely to secure the dressings, and not to make any considerable, or equable pressure.

A bandage is termed *compound*, when several pieces of linen, cotton, or flannel, are sewed together in different directions, or when the bandage is torn or cut, so as to have several tails. Such are the T bandage, the suspensory one, the capistrum, &c.

The *eighteen-tailed bandage* is one of the most compound. It is now in general use for all fractures of the leg and thigh, sometimes for those of the forearm, and, frequently, for particular wounds. Its great recommendations are the facility with which it can be undone, so as to allow the parts to be examined, and its not creating, on such an occasion, the smallest disturbance of the disease, or accident.

The eighteen-tailed bandage is made by a longitudinal portion of a common roller, and by a sufficient number of transverse pieces, or tails, to cover as much of the part as is requisite.

Each of the cross pieces is to be proportioned in length to the circumference of the part of the limb, to which it is to be applied; so that in making this sort of bandage for the leg, or thigh, the upper tails will be twice as long as the lower ones. After laying the long part of the bandage on a table, fix the upper end of it in some way, or another. Then begin laying the upper tails across it, and proceed with placing the rest. Each tail must be long enough to extend about two inches beyond the opposite one, when they are both applied. The tails, being all arranged across the longitudinal band, they are to be stitched in this position with a needle and thread. When the bandage is intended for the leg, a piece of the longitudinal part of the roller below, is to extend beyond the tails. This is usually brought under the sole of the foot, and then applied over the inner ankle in the first instance, after the bandage has been put under the limb. Then the surgeon lays down the first of the lower tails, and covers it with the next one above. In this way, he proceeds upward, till all the cross pieces are applied, the uppermost one of which he fastens with a pin. This bandage has a very neat appearance. The tails are said to lie better, when placed across the longitudinal piece a little obliquely. (*Pott.*)

The *T bandage* is, for the most part, used for covering parts of the abdomen and back, and, especially, the scrotum, perinæum, and parts about the anus. Its name is derived from its resemblance to the letter T, and it is, as Mr. John Bell remarks, the peculiar bandage of the body. If the breast, or belly, be wounded, we make the transverse piece, which encircles the body, very broad, and having split the tail-part into two portions, one of these is to be conveyed over each side of the neck, and pinned to the opposite part of the circular bandage, so as to form a suspensory for the latter, and prevent its slipping down. But, says Mr. John Bell, if we have a wound, or disease, or operation, near the groin, or private parts, the tail-part then becomes the most important part of the bandage; then the transverse piece, which is to encircle the pelvis, is smaller, while the tail-part is made very broad. When the disease is in the private parts, perinæum, or anus, we often split the tail according to circumstances; but, when the disease is in one groin, we generally leave the tail-part of the bandage entire and broad.

The *linteum scissum*, or *split-cloth*, is a bandage applied occasionally to the head, and consists of a central part, and six, or eight tails, or heads, which are applied, as follows:

When the cloth has six heads, the middle, or unsplit part of the cloth is applied to the top of the head. The two front tails go round the temples, and are pinned at the occiput; the two back tails go also round the temples, and are pinned over the forehead, the two middle tails are usually directed to be tied under the chin; but, as Mr. John Bell observes, this suffocates and heats the patient, and it is better to tie them over the top of the head, or obliquely, so as to make pressure upon any particular point. (*Principles of Surgery, Vol.* 1, *p.* 131.)

The old surgeons usually split this middle tail into two parts, a broad, and narrow one. In the broad one, they made a hole to let the ear pass through. This broad portion was tied under the chin, while the narrow ends were tied obliquely over the head. As Mr. John Bell has observed, though this gave the split-cloth the effect of eight tails, yet, the ancient surgeons did not name it the split-cloth with eight tails. When they split the cloth into eight tails, and, especially, when they tied the eight tails in the fol-

lowing particular manner, they called the bandage *cancer*, as resembling a crab in the number of its legs. The *cancer*, or *split-cloth of eight tails*, was laid over the head, in such a manner, that four tails hung over the forehead and eyes, while the other four hung over the back of the head. They were tied, as follows; first, the two outermost tails, on each side in front, were tied over the forehead, while the two middle tails in front were left hanging over the knot. Then the two outermost, or lateral tails behind were tied round the occiput. Next the middle tails were tied, the two anterior ones being made to cross over each other, and pass round the temples to be pinned at the occiput; while the two middle tails behind, were made to cross each other, and pass round the temples, so as to be pinned over the ears, or near the forehead. (See *John Bell's Principles, Vol.* 1, *p.* 132.)

The *triangular bandage* is generally a handkerchief doubled in that form. It is commonly used on the head, and, now and then, as a support to the testicles, when swelled. The French term it *couvre-chef en triangle*.

The *nodose bandage*, called also *scapha*, is a double-headed roller, made of a fillet four yards long, and about an inch and a half broad. It must be reversed two, or three times, so as to form a knot upon the part, which is to be compressed. It is employed, when a hemorrhage from a wound is to be stopped, or, for securing the compress, after bleeding in the temporal artery.

The most convenient bandage in general for the forehead, face, and jaws is the *four-tailed one*, or *single split-cloth*.

It is composed of a strip of cloth, about four inches wide, which is to be torn at each end, so as to leave only a convenient portion of the middle part entire. This unsplit middle portion is to be applied to the forehead, if the wound be there, and the two upper tails are carried backward, and tied over the back part of the head, while the two lower ones are to be tied either over the top of the head, or under the chin, as may seem most convenient.

When the wound is on the top of the head, the middle of the undivided part is to be applied to the dressings. The two posterior tails are to be tied forward, and the two anterior ones are to be carried backward, so as to be tied behind the head. This is sometimes called *Galen's bandage*. It is curious, that writers on bandages should use the terms *head*, and *tail*, synonymously, and hence this *four-tailed bandage* is often called the *sling* with *four heads*. Such confusion of language is highly reprehensible, as it contributes, in a very great degree, to obstruct the comprehension of any, the most simple subject.

If the upper lip be cut, and a bandage needed, which is seldom the case, it is almost superfluous to say, that this bandage will serve the purpose. It serves also in cuts of the lower lip, though there, also, we trust rather to the twisted suture, than a bandage.

The single split-cloth is particularly useful in supporting a fractured lower jaw, and, in such cases, is the only one employed in modern surgery. This bandage, when used for this particular purpose, namely, supporting the lower jaw, is named *capistrum*, or *bridle*, because it goes round the part somewhat like a horse's halter.

"In some cases, (says Mr. John Bell) the circumstances require us to support the chin particularly, and then the unsplit part of the bandage is applied upon the chin with a small hole to receive the point; but, where the jaw is broken, we pad up the jaw-bone into its right shape, with compresses pressed in under the jaw, and secured by this bandage. When we are in fear of hemorrhagy after any wound, or operation, near the angle of the jaw, we can give the sling a very remarkable degree of firmness. For this purpose, we tear the band into three tails on each side, and we stitch the bandage at the bottom of each split, lest it should give way, when drawn firm, &c." (*Principles of Surgery, Vol.* 1.)

We have already described one way of applying a handkerchief, as a bandage to the head, when we noticed the *triangular one*, or *couvre-chef en triangle*. The other manner of applying the handkerchief, called the *grand couvre-chef*, is as follows:

You take a large handkerchief, and fold it, not in a triangular, but a square form. You let one edge project about three finger-breadths beyond the other, in order to form a general border for the bandage. You lay the handkerchief upon the head, so as to make the lower fold, to which the projecting border belongs, lie next the head; while the projecting border itself is left hanging over the eyes, till the bandage is adjusted. The two corners of the outermost fold are first to be tied under the chin; the projecting border is then to be turned back, and pinned in a circular form round the face, while the corners of the fold next the head are to be carried backward, and tied.

After the outer corners of this bandage have been tied under the chin; after the inner corners have been drawn out and carried round the occiput; and after the border has been turned back and pinned;

the doubling of the handkerchief over each side of the neck hangs in a loose awkward manner. It remains, therefore, to pin this part of the handkerchief up above the ear, as neatly as can be contrived. (See *J. Bell's Principles.*)

The grand couvre-chef has certainly nothing to recommend it, either in point of utility, or elegance. A common night-cap must always be infinitely preferable to it. In the event, however, of a cap not being at hand, it is proper that the surgeon should know, what contrivances may be substituted to fulfil the objects in view.

Having, in the numerous articles of this Dictionary, noticed the mode of applying bandages in particular cases, and allotted a few separate descriptions for such bandages, as are not here mentioned, but, which are often spoken of in books, we shall conclude for the present, with referring the reader for further information to *Motherby's Medical Dictionary; Rees's Cyclopædia; and John Bell's Principles of Surgery, Vol* 1. *Galen and Vitus Vidius are reckoned the best of the old writers on the subject; M. Sue, Thillaye, Heister, Lombard, and Bernstein; of the modern ones. The latter are said, however, to be all too prolix.* (See *Rees's Cyclopædia, art. Bandage.*)

BARK, *Peruvian.* (See *Cinchona.*)

BA'THRON. A Greek word, denoting, in a surgical sense, a machine for extending broken limbs, sometimes called the *Scamnum Hippocratis.* It is described by Oribasius and Scultetus.

BA'TRACHOS, or BA'TRACHUS. The tumour, which occasionally takes place under the tongue, and is more commonly called *Ranula.*

BDELLA. In a surgical sense, a varix, or dilated vein.

BELLADONNA. *Deadly Night-shade.* Is violently narcotic. The leaves were first used externally for discussing scirrhous swellings, and they have been subsequently given internally, in scirrhous and cancerous diseases, amaurosis, &c. Five grains are reckoned a powerful dose: one is accounted enough to begin with. At present, the extract, as directed by the London College, is more commonly prescribed.

From the power, which belladonna is known to possess, of lowering the action of the whole arterial system, it seems to be a fit medicine in many surgical cases, where that object is desirable, particularly in examples of aneurism.

A very peculiar virtue, which belladonna has, is that of causing a dilatation of the pupil, when used as an external application to the eye-brow and eye-lids. The late Mr. Saunders was in the habit of employing belladonna a good deal for this express purpose. A little while before undertaking the operation for the congenital cataract, he was accustomed to introduce some dissolved extract of belladonna between the eye-lids, or rub the eye-brow and skin about the eye freely with the same application. The consequence was, that, if there were no adhesions of the iris to other parts, a full dilatation of the pupil was produced in less than an hour, and the whole of the cataract was distinctly brought into view. This was unquestionably a considerable improvement, in practice, as the iris was kept out of danger, and the operation materially facilitated. I allude here more particularly to Mr. Saunders's own method, in which he introduced the needle through the cornea, in front of the iris, and then conveyed it to the cataract through the enlarged pupil. Belladonna was also externally applied by Mr. Saunders, after the operation, with a view of preventing the edge of the iris from becoming adherent to the edges of the torn capsule.

BINOCULUS. (from *binus*, double, and *oculus*, the eye.) A bandage for keeping dressings on both eyes. Its application will easily be understood by referring to *Monoculus.*

BISTOURY. (*Bistoire*, French.) Any small knife for surgical purposes.

BLADDER, *Puncture of.* This is an operation, to which we are obliged to have recourse, after having in vain employed all the other means indicated for preventing the bad, and even fatal consequences of a stoppage of the evacuation of the urine, and distention of the bladder. Various accidents, and diseases, both acute and chronic, may occasion this dangerous state, as we shall more particularly notice in the article, *Urine, Retention of.*

The bladder, which can conveniently hold about a pint and a half of urine, is no sooner dilated, so as to contain two pints, than uneasy sensations are experienced. The desire of discharging the water now becomes very urgent, and if the inclination be not gratified, and the bladder be suffered to be dilated beyond its natural state, it loses all power of contraction, and becomes paralytic. The desire, indeed, continues, and the efforts are renewed in painful paroxysms; but, the power is lost, and the bladder becomes more and more distended. When this viscus is dilated in the utmost degree, and neither its own structure, nor the space in the abdomen can allow a further distention; either the bladder must be lacerated, which it never is, so equally is it supported by the pressure of the surrounding parts; or its orifice must ex-

pand and the urine begin to flow. After the third day of the retention, the urine often really begins to flow, and, whatever descends from the kidnies is evacuated in small quantities from time to time, and at this period, the bladder is distended in as great a degree, as it ever can be, however long the patient may survive. This dribbling of the urine, which begins, when the bladder is dilated to the utmost, and continues till the eighth, or tenth day, or till the bladder sloughs, has long been understood, and is named by the French, "*urine par régorgement.*" To practitioners, who do not understand it, the occurrence is a most deceitful one. The friends felicitate themselves, that the urine begins to flow; the surgeon believes it, basins and cloths, wet with urine, are easily produced; but, the patient lies unrelieved. The continued distention of the bladder is followed by universal inflammation of the abdomen. The insensibility, and low delirium of incipient gangrene, are mistaken for that relief, which was expected from the flow of urine, till either hiccough comes on, and the patient dies of fever, and inflammation, or the urine gets through an aperture, formed by mortification, into the abdomen. Let no surgeon, therefore, trust to the reports of nurses and friends, but, lay his hand upon the hypogastric region, and tap with his finger, that he may distinguish the distended bladder, and the fluctuation of urine. As the bladder suffers no further distention, after the third day, why should it burst? Not from laceration; for, it is supported by the uniform pressure of the surrounding viscera; not by yielding suddenly, for it is distended to its utmost on the third day of the retention, and yet seldom gives way before the tenth; not by attenuation, for it becomes thickened. The term *laceration* was never more wrongly applied, than in this instance; for, when there is a breach in the bladder, it is found, on dissection, to be a small round hole, such as might be covered with the point of the finger. The rest of the viscus, and the adjacent bowels, are red and inflamed, while this single point is black, and mortified! Delay is more dangerous, than even the worst modes of making an opening into the bladder, and, while life exists, the patient should have his chance. —(See *John Bell's Principles of Surgery, Vol.* 2, *Part* 1, *p.* 262, *&c.*)

That many patients die after the paracentesis of the bladder is an undoubted truth, and this circumstance has rather intimidated practitioners against the operation. It appears to me, however, that death may in general be more fairly ascribed to the effects of the disease, than to the puncture of the bladder, and that, if this last measure were not deferred so long, as it often is, the recoveries would be more numerous.

Hence, when relief cannot be obtained by the treatment described in the article, *Urine, Retention of*; when no urine has come away, before the end of the third day; when it only does so in a dribbling manner after this period, while the bladder continues distended, and no catheter can be introduced; the operation should not be delayed. In urgent cases, one should rather operate, as soon as forty-eight hours have elapsed.

No doubt, a man, who is exceedingly skilful in the use of the catheter, and knows how to practise with science and judgment all the other means for relieving the retention of urine, will not frequently find it necessary to have recourse to the operation of puncturing the bladder. This is said to have been so much the case with the eminent Desault, that, in the course of ten years, he had occasion only once to perform such an operation in the Hôtel Dieu, where diseases of the urethra are always extremely numerous. (See *Œuvres Chir. de Desault par Bichat, Tom.* 2, *p.* 316.) When, however, this superior manual dexterity with the catheter is not the acquirement of the practitioner, the timely performance of the paracentesis of the bladder should ever be observed. I shall next treat of the three modes of doing the operation.

1. *Puncture through the Perinæum.*

The first surgeon that ever performed this operation is said to have been M. Tolet, a French surgeon, well known for a valuable treatise, entitled, "*Traité de Lithotomie*, ou de l'extraction de *la pierre hors de la vessie*, *Troisieme édition*, *Paris* 1681." According to Sabatier, it was customary, at the time of Dionis, to make the opening with a narrow pointed scalpel, about four or five inches long, which was plunged into the bladder, at the place where the incision int he apparatus major terminated. (See *Lithotomy.*) The escape of the urine indicated when the surgeon had reached the bladder. A straight probe was then conducted along the knife, and, then a cannula was passed along the probe into the bladder, where it was allowed to remain as long as necessary, care being taken to fix it by means of tapes, passed through the rings at the broad part of the instrument; and to stop up the opening with a linen tent. Some practitioners, however, began with cutting the perineum, after introducing a staff as far into the urethra as possible. Having made an opening into this canal, they conveyed a gorget along the staff into the bladder, and a cannula was next passed into the same viscus along the

gorget, and allowed to continue there. This mode of proceeding, which Sabatier terms more methodical, than that which has been first mentioned, could only answer in cases, where the obstruction about the neck of the bladder was inconsiderable, and where in fact the introduction of the catheter was not yet impracticable. At least, therefore, the method was unnecessary. The other plan of piercing the urethra in several places, and making a passage for the urine through the prostate, says Sabatier, increased the inflammation, with which this gland was affected, and rendered the disease, if not mortal, at least much more difficult of cure.

Sabatier represents Dionis, as the first who suggested the method of opening the bladder on one side of the perineum, at the part, where Frère Jacques used to perform lithotomy. Dionis conceived, that, by operating in this way, the patient would suffer less pain, because neither the urethra, nor the neck of the bladder, would be injured; but at the same time, he has recommended a process, to be followed, which was similar to that pursued in making the puncture in the middle of the perineum; viz. that a narrow scalpel should first be introduced, so as to make a passage for the probe, along which the cannula is to pass into the bladder. The idea of substituting for these unsuitable instruments a trocar of convenient length was exceedingly simple, and, for this improvement, which took place in 1721, surgery is indebted to Juncker. (See *Conspectus Chirurgiæ, Tab.* 97, *p.* 674), unless the following passage be correct: "In the year 1717, or 1718, M. Peyronie shewed in the King's garden a long trocar, which he had successfully employed in a similar puncture." (*Desault's Parisian Chirurgical Journal, Vol.* 2, *p.* 267.)

The patient having been placed in the same position as for lithotomy, an assistant is to press with his left hand on the region of the bladder, above the pubes, in order to propel that viscus as far downward into the lesser pelvis as possible, while, with his right hand, he supports the scrotum. The surgeon is then to introduce the trocar at the middle of a line, drawn from the tuberosity of the ischium to the raphe of the perineum, two lines more forward than the verge of the anus. The instrument is first to be pushed in a direction parallel to the axis of the body; and its point is afterwards to be turned a little inwards. Here, according to Bichat, there is no occasion to convey the cannula so far into the bladder, as is done, when the operation is performed above the pubes. The portion of this viscus, that is pierced, being incapable of changing its position, with regard to other parts in the perineum, if the cannula only project a few lines into its cavity, it will not be liable to slip out. It would be wrong, indeed, to carry it in further; for, the pressure of its end against the posterior parietes of the bladder would do harm. Lastly, the cannula is to be fixed in its place, by means of the T bandage. (See *Œuvres Chirurgicales de Desault, Tom.* 3, *p.* 320.)

Some writers recommend the introduction of the left index finger into the rectum, in order to draw this intestine out of the way; but Sabatier thinks it better to use this finger for pressing on the part of the perineum, where the puncture is about to be made, so as to make the skin tense, and assist in the guidance of the trocar. (*Médecine Opératoire, Tom.* 2, *p.* 126.)

The parts, divided in this puncture, are the skin, a good deal of fat, and cellular substance, the levator ani muscle, and that portion of the lower part of the bladder, which is situated on one side of its neck.

The following is the judgment which Bichat has passed upon this method: There is in the track, which the trocar describes, no part, of which the puncture must of necessity give rise to bad symptoms. A surgeon, moderately exercised in the practice of this operation, is almost always sure of piercing the bladder. This viscus is opened in the most depending situation, at a part, which constantly bears the same relation to the perinæum. But, the position, in which the patient is placed for the operation, is a great deal more disagreeable, than that for the puncture above the pubes. Several assistants are required to fix him, and one is necessary for compressing the bladder in the hypogastric region. There is a possibility of wounding the vessels of the perineum, and of pricking the nerves, which accompany them. If the point of the trocar is carried too much outwards, it may glide on the external side of the bladder. If it is inclined forwards, it may slip between this viscus and the pubes. If it is turned too much inwards, it may pierce the prostate gland. If directed too much backwards, it may wound the vasa deferentia, the rectum, the extremity of the ureter, and the vesiculæ seminales. While the cannula is kept introduced, also, the patient can neither walk about, nor sit down; but, must continually keep himself in bed. Lastly, this mode of operating is frequently counter-indicated, by tumors, or other common diseases, at this part of the body, in consequence of retentions of urine. (*Œuvres Chirurgicales de Desault par Bichat, Tom.* 3, *p.* 321.)

The puncture of the bladder from the

perineum is now almost universally abandoned by British surgeons. "We may esteem it fortunate," says Desault, "if the trocar penetrates directly into the bladder, after piercing the fat and the muscles, situated between the tuberosity of the ischium and the anus; and, as this viscus is subject to much variation in its form, the surgeon will be often defeated, unless he is perfectly clear in his ideas, respecting its situation and figure. This disappointment is not without example, and there is sufficient to deter a practitioner from performing this operation, independently of the danger of wounding with the trocar the vasa deferentia, vesiculæ seminales ureter," &c. (*Parisian Chirurgical Journal, Vol.* 2, *p.* 267.)

If there are now any practitioners, who may be averse to the total relinquishment of this method, I think the following caution, given by Sabatier, may be of service to them: perhaps, the operation would be more safe, if the surgeon were to begin with making a deep incision in the perineum, as is practised in the lateral way of cutting for the stone, and if he were to desist from plunging the trocar into the bladder, until he had assured himself of the situation of this viscus, and felt the fluctuation of the urine. Garengeot has given this advice to Foubert, in regard to the mode of cutting for the stone practised by the latter, and it seems equally applicable in the present place. (*Médecine Opératoire, Tom.* 2, *p.* 127.)

2. *Puncture above the Pubes.*

The invention of the method of tapping the bladder from above the pubes was suggested by the practicableness of extracting calculi from that viscus, by what is usually denominated the high operation. The first performers of the puncture above the pubes are said to have employed a straight trocar, the very same instrument as was used for tapping the abdomen in cases of dropsy. The consequence was, that when such a trocar was too long, its cannula was apt to hurt the opposite parietes of the bladder, so as to occasion inflammation and a slough, on the separation of which the urine was liable to insinuate itself either into the abdomen, or rectum, as happened in a case mentioned by Mr. Sharp, where no more urine was discharged through the cannula, and the patient died of a sort of diarrhœa. When the trocar is short, the bladder, on subsiding and contracting itself, gradually quits the cannula, which becomes useless, and a necessity for making another puncture is produced. Whatever pains may be taken to direct the trocar obliquely downwards and backwards, so that the cannula may be, in some degree, parallel to the axis of the bladder, one, or the other of these accidents, cannot always be prevented.

Their prevention, however, may be effected by merely employing, instead of a straight trocar, a curved one, which will naturally take a suitable direction. This improvement was embraced by Frère Come, the inventor of the lithotome caché, who also devised a curved trocar, for the paracentesis of the bladder, very superior to the instrument of the same shape previously in use.

To this way of operating, Mr. Sharp was partial, and Mr. Abernethy has more recently recommended it, under certain circumstances. The former celebrated surgeon remarks, that it is an operation of no difficulty to the surgeon, and of little pain to the patient, the violence done to the bladder being at a distance from the parts affected. It is equally applicable, whether the disorder be in the urethra, or prostate gland, and when there are strictures, the use of bougies may be continued, while the cannula remains in the bladder. (*Critical Enquiry, p.* 125, *edit.* 4.)

Some writers recommend making an incision, about two inches long, through the linea alba, a little way above the pubes, and then introducing a trocar into the bladder. Others deem this preliminary incision quite useless, asserting, that the operation may be performed with equal safety, and less pain to the patient, by puncturing at once the skin, the linea alba, and the bladder. When the trocar has been introduced, the stilette must be withdrawn, and the cannula kept in its position by a ribbon, passed through two little rings, with which it should be constructed, and fastened round the body.

The orifice of the cannula should be stopped up with a little plug, so as to keep the urine from dribbling away involuntarily, and taken out as often as occasion requires. (*Encyclopédie Méthodique; Part. Chirurg. Art. Paracentese de la Vessie.*)

The trocar should be introduced in a direction obliquely downward and backward; for as this corresponds with the axis of the bladder, the instrument is less likely to injure the opposite side of that organ.

Nearly all writers advise the puncture to be made an inch, or an inch and a half, above the pubes. The reasons for so doing are the following: "If the puncture be made close to the os pubis, the bladder in that part, often rising with an almost perpendicular slope, leaves a chasm between it and the abdominal muscles, or, to speak more strictly, a certain depth of membrana cellularis only, so that, if the trocar penetrate but a little way, it possibly may not enter into the bladder.

If it penetrates considerably, it may pass through the bladder into the rectum, or, if not in the operation itself, some days afterwards, when by the course of the illness and confinement the patient is more wasted. For, the abdominal muscles, shrinking and falling in, occasion the extremity of the cannula to press against the lower part of the bladder, and, in a small time, to make a passage into the rectum." (*Sharp in Critical Enquiry, p.* 127.) Though the reasons here adduced seem at first as formidable, as they are numerous, does not the danger of injuring the peritoneum, form an objection to plunging in a trocar at the above distance from the pubis? Certain it is, peritonitis would be more apt to be induced by such practice, than by introducing the instrument immediately above the pubes. Richerand decidedly condemns the plan, principally because the higher the puncture is made, the more apt will the bladder be to quit the cannula, on the urine being discharged. (See *Nosographie Chirurgicale, Tom.* 3, *p.* 472, *edit.* 2.) In Desault's works, by Bichat, the puncture is also advised to be made immediately above the pubes. *Tom.* 3, *p.* 318. Some of Mr. Sharp's objections are done away, by taking care to pass the trocar into the bladder in the axis of this viscus, and employing one which is somewhat curved, as Hunter, Frère Côme, Sabatier, &c. have advised. Mr. Sharp confirms the danger of using too long a cannula, by mentioning an accident, which occurred in his own practice. Though he introduced the instrument more than an inch and a half above the os pubis, yet having pushed it full two inches and a half, below the surface of the skin, its extremity in six, or seven days insinuated itself into the rectum. (*Critical Enquiry, p.* 127.) The instrument, says an excellent writer, should be more or less long, according to the embonpoint of the patient; but, the ordinary length should be about four inches and a half. The curvature should be uniform, and form the segment of a circle about eight inches in diameter. (*Œuvres Chir. de Desault par Bichat, Tom.* 3. *p.* 317.)

A catheter left in the bladder, longer, than ten days, may possibly gather such an incrustation from the urine, as not only to render the extraction of it painful, but even impracticable. This should caution us, therefore, never to leave the cannula in the bladder quite a fortnight. If necessary to leave one so long, Mr. Sharp advises a second one to be introduced, made with an end, like that of a catheter. (*Critical Enquiry, p.* 129.)

Mr. Abernethy first made an incision, between the pyramidales muscles, passed his fingers along the upper part of the symphysis pubis, so as to touch the distended bladder, and introduced a common trocar, of the middle size, in a direction obliquely downwards. On withdrawing the stilette, he passed a middle-sized hollow elastic catheter, through the cannula, into the bladder. The cannula was withdrawn, and the catheter left in, till the urine passed through the urethra. After a week, as the instrument was stopped up with mucus, it was taken out, and a new one introduced. (*Surgical Observations*, 1804.) It might be objected to this plan of employing a hollow bougie, that, as it is smaller, than the wound, the urine is not kept from passing between the instrument, and parts, into which it is introduced, as well as through the tube itself. This happened in Mr. Abernethy's case, and, though no urine in this instance, got into the cellular membrane; yet, it would probably do so sometimes, because, it is not till after inflammation has taken place, that the cavities of the cellular substance are closed by coagulating lymph. After a time, however, the cannula of the trocar might be withdrawn, and the hollow bougie employed, if preferred, though it seems difficult to discover a reason for chusing it.

The following is one of Mr. Home's conclusions: (*Med. and Chir. Trans. Vol.* 2.) "When the puncture is made above the pubis, the cannula, which incloses the trocar is not to be removed, till the surrounding parts have been consolidated by inflammation, so as to prevent the urine in its passage out from insinuating itself into the neighbouring parts; for wherever the urine lodges, mortification takes place. Any advantage, therefore, which may arise from a more flexible instrument remaining in the bladder, is more than counterbalanced by its not filling completely the aperture through the coats of the bladder, and allowing the urine to escape into the cellular membrane."

There is much truth in the following passage: The abdomen is inflamed; the preliminary incisions, which prepare for the introduction of the trocar, sometimes pass through several inches of fat, and cellular substance; the incisions must be wide in proportion to their depth; the cannula is no sooner lodged here, than it is displaced, in some degree, by the contraction of the bladder, which, when emptied, subsides under the pubis. The cannula stands so obliquely, that the urine never flows with ease, but, by running out upon the wound, and by being injected among the cellular substance, it causes the wound to inflame; the wound by its proximity to the inflamed peritonæum soon mortifies, and thus, notwithstanding the temporary relief, produced by the emptying of the bladder, the patient dies

on the third or fourth day. (*John Bell's Principles of Surgery, Vol. 2, p. 271.*)

That this operation is infinitely better, than that of making the puncture in the perineum is indisputable. There are even now some good surgeons, who seem to prefer it to the method of tapping the bladder from the rectum. In the Œuvres Chirurgicales de Desault, Tom. 3, p. 324, it has received the preference, and at p. 319 of the same book, a high encomium is bestowed on it, in the following terms. "This operation is easy. The little thickness of the parts, which are to be wounded, renders it quick and triflingly painful. The surgeon has occasion for no assistance. The patient is neither intimidated, nor fatigued with the posture in which he is put. It is almost impossible to miss the bladder, except it were exceedingly contracted. There is no risk of piercing the cavity of the abdomen. Anatomy proves, that here the bladder is in immediate contact with the recti muscles, and that when this viscus is distended with urine, it pushes the peritoneum upwards and backwards, under which membrane it enlarges, and thus makes the point of the trocar become more and more distant from the cavity of the abdomen. The patient may easily lie on his side, or abdomen, so as to discharge all the urine contained in the bladder. There are here no nerves, nor vessels, of which the injury can be dangerous. No difficulty is experienced in fixing the cannula, and the presence of this instrument does not hinder the patient from sitting, standing up, or even walking about in his chamber. When the cannula, also, is introduced to the lower part of the bladder, this viscus cannot possibly quit it. Lastly, the wound heals with more facility, than that made in any other method."

Respecting this advice to push the cannula so far into the bladder, it is highly objectionable, for the reason already explained. The writer of the preceding commendation seems to me rather too partial. He has told us of the little thickness of the wounded parts, and, yet a little before bestowing these praises, he has acknowledged, "*il est rare, que dans cette ponction, on traverse directement la ligne blanche: on passe presque toujours sur ses côtés, et l'on divise la peau, l'aponéurose des muscles larges du bas-ventre, les muscles droits, quelquefois l'un des pyramidales, et la paroi antérieure de la vessie.*" (*Tom. 3, p. 318.*)

According to my own judgment, the plan, which is about to be described, is the safest and best, when the circumstances of the case afford a choice, and that it would be for the benefit of the afflicted, if the puncture above the pubes were only performed in cases in which the enormous enlargement of the prostate gland prevents a puncture from being safely made from the rectum.

3. *Puncture from the Rectum.*

This method is more generally applicable, than either of the two plans above related. It is not, like the puncture in the perinæum, liable to the objection, that the wound is made on diseased or inflamed parts, which afterwards become gangrenous. Nor is it, like the puncture above the pubes, attended with a chance of the urine diffusing itself in the cellular membrane. It has also the advantage of emptying the bladder completely. The puncture is made sufficiently far from the neck of the bladder not to increase any inflammation existing in that situation; and the operation is really attended with little pain, since there is no skin, nor muscles to be wounded, merely the coats of the bladder and rectum, at a point where these viscera lie in contact with each other. The enlargement of the prostate gland, is, perhaps, the only solid reason against its being uniformly preferred.

When the bladder is to be tapped from the rectum, two fingers should be introduced into the intestine, instead of one, as has been directed. In this manner, the cannula can be more conveniently guided, and held in a proper position, while the trocar is introduced with the other hand. The stilette, however, must never be introduced into the cannula, except when this is properly placed, with its extremity against the part, where it is intended to make the puncture.

We read in the *Philosophical Transactions* for 1776, of a case of total retention of urine, from strictures, where the bladder was successfully punctured from the rectum. Mr. Hamilton, who did the operation, thought of the plan, in consequence of feeling the bladder exceedingly prominent in the rectum, on introducing his finger into the anus.

The patient was placed in the same position as that in lithotomy; a trocar was passed along the finger into the anus, and pushed into the lowest, and most projecting part of the swelling, in the direction of the axis of the bladder. A straight catheter was immediately introduced through the cannula, lest the bladder by contracting should quit the latter, which was taken away, and, as soon as the water was discharged, the catheter was also removed. Notwithstanding the puncture, the bladder retained the urine as usual, until a desire to make water occurred. Then the opening made by the instrument seemed to expand, and the water flowed in a full stream from the anus. The urine came away, in this manner, two days, after which it passed

the natural way, with the aid of a bougie, which had been passed, through the urethra, into the bladder, and which was used, till all the disease in this canal was cured.

The method is said to have been originally proposed in 1750, by M. Fleurant, surgeon of the hospital *La Charité*, at Lyons, and Pouteau, in 1760, published an account of it, and three cases in which Fleurant had operated. It was also the feel of the bladder, on the introduction of a finger *intra anum*, which led the latter surgeon to choose making a puncture in this situation. The urine was immediately discharged, and the cannula supported in its place with the T bandage, until the natural passage was rendered pervious again. But the cannula, being allowed to remain in the rectum, became incommodious to the patient, when he went to stool, and, the inconvenience was vastly increased by the continual dribbling of the urine from the mouth of the instrument. Hamilton avoided both these inconveniences, by withdrawing the cannula at first. In another instance, however, Fleurant left the cannula in the anus and bladder, thirty-nine days, without the least inconvenience.

In order to lessen the inconvenience, attending the presence of the cannula, Fleurant suggested that it would be better to have the tube made of a flexible substance; a proposal, that seems to merit attention, though, I believe, the inconveniences of wearing the cannula are not in general very serious, and, were a case of this kind to present itself, I should have no hesitation in withdrawing the tube altogether.

In the first volume of the *Mem. of the Medical Society of London*, two cases are related, in which, after tapping the bladder from the rectum, the cannula was immediately withdrawn, without any bad effect. Another similar fact is recorded in the *Medical Communications*, *Vol.* 1.

A long, curved, cylindrical trocar, is the best for performing the operation, and was the one recommended by Pouteau. It should be introduced a little beyond the prostate gland, exactly in the centre of the front of the rectum, and sufficiently far up this intestine. In this way the vesiculæ seminales, which diverge from each other above, cannot be injured; and, even were they so, perhaps no serious consequences would follow.

It is not necessary to retain the cannula in the puncture, after the inflammation has consolidated the sides of the wound, and there is no danger of the aperture closing up, till there is another passage made for the urine. Mr. Home thinks, that after about thirty-seven hours, the cannula may be properly taken out. (*Med. and Chir. Trans. Vol.* 2.) Indeed, I am not acquainted with any fact, shewing the ill effect of removing the cannula at once; for, here the urine has only to pass through a mere opening, without any longitudinal extent, as after puncturing above the pubes. The safety and simplicity of tapping the bladder from the rectum, will always recommend this method with impartial practitioners. The wound is made at a distance from the peritoneum, passes through no thickness of parts, and is quite unattended with any chance of the urine becoming extravasated in the cellular substance. Whether the bladder be morbidly contracted and thickened; whether the neck of the bladder be inflamed; it is equally applicable: the diseased enlargement of the prostate gland, can alone warrant the puncture above the pubes being ever preferred.

I am happy to join the experienced and judicious Mr. Hey with the advocates for this mode of performing the operation, and as his opinion on this subject must have considerable influence, I shall quote the following passage from his valuable work, particularly as the observations confirm some other points adverted to in the present article. "It is sometimes impossible, from various causes, to make a catheter pass through the urethra. The puncture of the bladder then becomes necessary, if the retention of urine continues. This operation may be performed, either above the pubes, or through the rectum. I have seen it performed in both these methods; but, give the preference to the latter. It is more easy to the surgeon; and less painful to the patient. Pouteau's carved trocar is a very convenient instrument; and may be used with safety for puncturing the bladder through the rectum; but, the operator should cautiously avoid wounding an artery, which may be felt running towards the anus, where the bladder is most protuberant. The finger, which is introduced into the rectum to guide the trocar, may be conveniently placed a little on either side of this vessel. It is not always necessary to leave the cannula in the bladder, as the urine sometimes begins to flow through the penis, within a few hours after the bladder is emptied. Perhaps, this event may be the most frequent, when the introduction of the catheter has been prevented by a stricture in the urethra. If the wound becomes closed, before the power of expelling the urine is regained, recourse must be had to a repetition of the operation, which gives very little trouble to the patient: neither is he

much incommoded by suffering the cannula to remain two or three days in the bladder. This is sometimes necessary, and seldom improper." (*Hey's Practical Observations in Surgery, p.* 430—431, *edit.* 2.)

Women seldom stand in need of the paracentesis of the bladder; but, when the operation is necessary in them, it is more safely and easily performed from the vagina, than in any other way. If it should be proper to leave in the cannula, this must be long enough to allow its orifice to be situated on the outside of the labia, where it must be fixed with a T bandage.

Consult particularly *Sharp on the Operations, Chap.* 15, *and his Critical Enquiry. L'Encyclopédie Méthodique, Partie Chirurgicale; art. Paracentése de la Vessie. Sabatier's Médecine Opératoire, Tom.* 2. *Med. and Chir. Transactions, Vol.* 2. *Abernethy's Surgical Observations,* 1804. *John Bell's Principles of Surgery, Vol.* 2. *Œuvres Chirurgicales de Desault par Bichat, Tom.* 3, *p.* 315, &c. *Richerand's Nosographie Chirurgicale, Tom.* 3, *p.* 471, &c. *edit.* 2. *Hey's Practical Observations in Surgery, p.* 430, *edit.* 2. *Melanges de Chirurgie, par Poutrau, Lyon,* 1760, *p.* 500. *Parisian Chirurgical Journal, Vol.* 2, *p.* 156, *and p.* 265.

Bladder, *Tumour extirpated from.* Mr. Joseph Warner, surgeon of Guy's Hospital, has recorded a case, in which an excrescence, growing from the inside of a young woman's bladder, was successfully removed. The patient, on the 24th of June, 1747, strained herself in endeavouring to lift a great weight, and she was immediately seized with a pain in the small of her back, and a total retention of urine. In April, 1750, she applied to Mr. Warner, who found, upon enquiry, that she had never been able, from the moment of the accident, to void a drop of urine, without the assistance of the catheter; that she was in continual pain, and had lately been much weakened, by having several times lost considerable quantities of blood, occasioned by the force made use of in introducing the instrument into the bladder.

Mr. Warner, upon examining the parts, with his forefinger, which he had great difficulty in introducing into the meatus urinarius, discovered a considerable tumor, which seemed to be of a fleshy substance, and took its rise from the lower part of the bladder near its neck. When the patient strained to make water, and the bladder was full, the excrescence protruded a little way out of the meatus urinarius; but, upon ceasing to strain, it presently returned.

A purgative having been given the day before the operation, and the rectum emptied by means of an emollient clyster, Mr Warner directed the patient to strain, so as to make the swelling project. He then hindered it from returning into the bladder by passing a ligature through it, and endeavoured to draw it further out. The latter object was found impracticable, on account of the size of the tumour. Seeing this, Mr. Warner dilated the meatus urinarius on the right side, by cutting it upwards, about half way towards the neck of the bladder, when, by pulling the swelling forwards, he was enabled to tie its base, which was very large, with a ligature.

For three days after the operation, a good deal of pain was felt in the abdomen. On the sixth day, the tumour dropped off. From the first day, the urine came away without assistance, and the patient got quite well. The tumour resembled a turkey's egg in shape and size. (See *Warner's Cases in Surgery, edit.* 4, *p.* 303.)

Perhaps, in this example, tying the tumour was preferable to cutting it away, even though its base was large; for, had the knife been used, there would have been some danger of the bladder becoming filled with blood.

Bladder, *Hernia of.* See *Hernia.*

Bladder, *Insects discharged from.* The instances, in which worms are stated to have been discharged from the bladder, are very numerous. Many cases of this kind are referred to in Voigtel's Handbuch der pathologischen Anatomie, b. 3, p. 337—342. A most interesting example has also been lately recorded by Mr. William Lawrence. (See *Medico-Chirurgical Transactions, Vol.* 2, *p.* 382, &c.)

Bladder, *Deficiency of.* Numerous examples, in which this deviation from the natural structure has occurred, are recorded by medical writers. The publications, however, which, as far as I know, contain the most ample information on the subject, are, a Gottingen inaugural dissertation, entitled, "*De Vesicæ Urinariæ Prolapsu Nativo,*" by Dr. Roose, late professor in Brunswick, and a paper, called, "*An attempt towards a systematic account of the appearances, connected with that malconformation of the Urinary Organs, in which the ureters, instead of terminating in a perfect bladder, open externally on the surface of the Abdomen,*" *by A. Duncan, jun. in Edinb. Med. and Surgical Journal, Vol.* 1. In this last production, may be seen references to all the most noted cases on record, both male and female.

Bladder. *Wounds of.* See *Gunshot Wounds.*

BLEEDING. By this operation is understood the taking away of blood for the relief of diseases. Bleeding is called *general,* when practised with a view of lessening the whole mass of circulating

blood; *topical*, when performed in the vicinity of the disease, for the express purpose of lessening the quantity of blood in a particular part.

General Blood-letting is performed with a lancet, and is subdivided into two kinds; viz. the opening of a vein, termed *phlebotomy*, or *venesection*; and the opening of the temporal artery, or one of its branches, termed *arteriotomy*.

Topical Blood-letting is performed, either by means of a cupping-glass and scarificator, by leeches, or by dividing the visibly distended vessels with a lancet. The latter is frequently done in cases of ophthalmy.

PHLEBOTOMY, OR VENESECTION.

The mode of bleeding most frequently practised is that of opening a vein; and it has been done in the arm, ankle, jugular vein, frontal vein, veins under the tongue, on the back of the hand, &c. In whatever part, however, venesection is performed, it is always necessary to compress the vein, between the place where the puncture is made, and the heart. Thus the return of blood through the vein is stopped, the vessel swells, becomes conspicuous, and, when opened, bleeds much more freely than it would otherwise do. Hence, according to the situation of the part of the body where the vein is to be opened, with regard to the heart, the fillet for making the necessary pressure must be applied, either above or below the puncture.

All the apparatus essential for blood-letting, on the part of the patient, is a bandage, or fillet, two or more small pieces of folded linen for compresses, a basin to receive the blood, and a little clean water and a towel. The bandage ought to be about a yard in length, and near two inches broad, a common ribbon or garter, being frequently employed. The compresses are made by doubling a bit of linen rag, about two inches square. On the part of the surgeon, it is necessary to have a good lancet, of proper shape. He should never bleed with lancets with which he has been in the habit of opening any kind of abscesses, as very troublesome complaints have been the consequence of doing so. The shape of the instrument is also a matter of some importance. If its shoulders are too broad, it will not readily enter the vein, and when it does enter, it invariably makes a large opening, which is not always desirable. If the lancet be too spear-pointed, an incautious operator would often run a risk of transfixing the vein, and wounding the artery beneath it. More, however, certainly depends on the mode of introducing the lancet, than on its shape.

In blood-letting, the patient may lie down, sit down, or stand up, each of which positions may be chosen according to circumstances. If the patient be apt to faint from the loss of a small quantity of blood, and such fainting can answer no surgical purpose, it is best to bleed him in a recumbent posture. But, when the person is strong and vigorous, there is little occasion for this precaution, and a sitting posture is to be preferred, as the most convenient, both for the surgeon and patient. This, indeed, is the common position. In some cases, however, particularly those of strangulated hernia, it is frequently an object to produce fainting, in order that the bowels may be more easily reduced. In this circumstance the patient may be bled in an erect posture, and the wound made large, as a sudden evacuation of blood is particularly apt to bring on the wished for swoon. For the same reason, if we wish to avoid making the patient faint, we should then make only a small puncture.

Every operator should be able to use the lancet with either hand, which will enable him to bleed the patient in the right or left arm, as circumstances may render most eligible.

At the bend of the arm, there are several veins in which a puncture may be made; viz. the basilic, cephalic, median basilic, and median cephalic. The median basilic vein, being usually the largest and most conspicuous, is that, in which the operation is mostly performed; but, surgeons should never forget, that it is under this vessel that the brachial artery runs, with the mere intervention of the aponeurosis sent off from the tendon of the biceps muscle. In very thin persons, indeed, the median basilic vein lies almost close to the artery, and nothing is then more easy than to transfix the first of these vessels and wound the last. Hence, Richerand advises all beginners to prefer opening the median cephalic, or even the trunk of the cephalic itself, to puncturing either the basilic, or the median basilic, which last are internally situated, and nearer the brachial artery. (*Nosographie Chirurgicale, Tom.* 3, *p.* 383, *Edit.* 2.)

In exceedingly fat subjects, the large veins at the bend of the arm are sometimes totally imperceptible, notwithstanding the fillet is tightly applied, the limb is put in warm water, and every thing done to make those vessels as turgid as possible. In this circumstance, if the surgeon has not had much experience in the practice of venesection, he will do well to be content with opening one of the veins of the back of the hand, after putting the member for some time in warm water, and applying a ligature round the wrist. In children, a sufficient quantity of blood cannot always be obtained by venesection, and, in this

event, the free application of leeches, and, occasionally, the puncture of the temporal artery, are the only effectual methods.

With respect to the choice of a vein in the arm, the most experienced operators give a preference to one, which rolls least under the skin. Such a vessel, though sometimes less superficial, than another, may commonly be opened with greater facility. The surgeon, however, is always to fix the vein, as much as he can, by placing the thumb of his left hand a little below the place, where he intends to introduce the lancet.

In bleeding in the arm, the fillet is to be tied round the limb, a little above the elbow, with sufficient tightness to intercept the passage of the blood through all the superficial veins; but, never so as to stop the flow of blood through the arteries, which would tend to prevent the veins from rising at all. The veins being thus rendered turgid, the surgeon must choose the one which seems most conveniently situated for being opened, and large enough to furnish as much blood as it may be proper to take away.

Before applying the fillet round the arm, however, the operator should always feel where the pulsation of the artery is situated, and, if equally convenient, he should not open the vein immediately over this part. It is also prudent to examine where a pulsation is situated, on account of the occasional varieties in the distribution of the arteries of the arm. The ulnar artery is sometimes given off from the brachial very high up, and, in this case, it frequently proceeds superficially over the muscles, arising from the internal condyle, instead of dividing under them, in the ordinary manner.

When the external jugular vein is to be opened, the surgeon generally makes the necessary pressure with his thumb. The orifice should be made in the direction of the fibres of the platysma myoïdes muscle; and the vein is not so apt to glide out of the way, when the surgeon makes the puncture just where it lies over a part of the sterno-cleido-mastoideus muscle.

When blood is to be taken from the foot, the ligature is commonly applied a little above the ankle.

The fillet having been put on the arm, the operator is to take the blade of the lancet, bent to a somewhat acute angle, between the thumb and fore-finger, and, steadying his hand upon the other three fingers, he is to introduce the lancet, in an oblique direction, into the vessel, till the blood rises up at the point of the instrument. Then bringing up the front edge in as straight a line as possible, the wound in the skin will be made of just the same size as that in the vein. The operator next takes away the thumb of his left hand, with which he steadied the vessel, and allows the blood to escape freely, till the desired quantity is obtained. The arm ought to be kept in the same position while the blood is escaping, lest the skin should slip over the orifice of the vein, keep the blood from getting out, and make it insinuate itself into the cellular substance.

When the blood does not issue freely, however, most surgeons direct the patient to move his fingers or turn something round and round in his hand. This puts the muscles of the arm into action, and the pressure, they then make on the veins, makes the blood circulate more briskly through these vessels.

The proper quantity of blood being discharged, the fillet is to be untied. The flow of blood now generally ceases; though sometimes, when the orifice is large, and the circulation very vigorous, it still continues. In this circumstance, the operator may immediately stop the bleeding, by placing the thumb of his left hand firmly on the vessel, a little below the puncture.

The blood is next to be all washed off the arm, the sides of the wound placed in contact, and the compresses applied, and secured with the fillet, put round the elbow in the form of a figure of 8, and regularly crossing just over the compresses.

The patient should be advised not to move his arm much, till the fillet is removed, which may be done after twenty-four hours.

In order to open the external jugular vein, the patient's head is to be laid on one side, and properly supported. Then the operator is to press upon the lower part of the vein with his thumb, so as to make the part above swell, and then the lancet is to be pushed at once into the vessel, with the cautions already stated.

There is commonly no difficulty in stopping the bleeding, after the pressure is removed. Some practitioners have directed a scalpel to be used for dividing the integuments, before opening the vein itself; but, this is quite unnecessary.

Blood-letting in the feet is executed on the same principle as in other parts; but, the blood from the veins in this situation, in general not flowing with much celerity, it is customary to immerse the feet in warm water, in order to promote the bleeding.

ARTERIOTOMY.

The only arteries from which blood is ever taken in practice, are the trunk and branches of the temporal artery, which lie in such a situation, that they may easily be compressed against the subjacent bones,

and the bleeding stopped. When the vessel which the surgeon chooses to open, lies very near the surface, or may be ascertained by feeling, or even seeing, its pulsation, it may be opened at once with a lancet. But, in many instances, it is so deeply situated, that it becomes necessary, in the first place, to make a cut in the skin, and then puncture the vessel.

The bleeding generally stops without any trouble; and may always be suppressed by a compress and bandage. In a very few cases, the blood bursts forth from time to time, and more is lost than is necessary. When this happens, notwithstanding pressure, it is recommended to divide the vessel completely across, which facilitates the process of nature in closing the end of the vessel.

TOPICAL BLEEDING.—CUPPING.

This is done by means of a scarificator, and a glass, shaped somewhat like a bell. The scarificator is an instrument containing a number of lancets, sometimes as many as twenty, which are so contrived, that when the instrument is applied to any part of the surface of the body, and a spring is pressed, they suddenly start out, and make the necessary punctures. The instrument is also so constructed, that the depth to which the lancets penetrate, may be made greater, or less, at the option of the practitioner. As only small vessels can be thus opened, a very inconsiderable quantity of blood would be discharged, were not some method taken to promote the evacuation. This is commonly done with a cupping-glass, the air within the cavity of which is rarified by the flame of a little lamp, containing spirit of wine, or as some choose, by setting on fire a piece of tow, dipped in this fluid, and put in the cavity of the glass. When the mouth of the glass is placed over the scarifications, and the rarified air in it becomes condensed, as it cools, the glass is forced down on the skin, and a considerable suction takes place.

Trials have been made of syringes, calculated for exhausting the air from cupping-glasses; but the plan is not found so convenient as the one we have described.

When the glass becomes moderately full, and it is desirable to take away more blood, it is best to remove it and put on another one.

A common pledget is usually applied as a dressing for the punctures made with the scarificator.

LEECHES.

Leeches are often preferable to cupping, which is attended with more irritation than many surfaces, in particular circumstances, can bear, especially when the topical bleeding is to be frequently repeated.

Leeches occasionally cannot easily be made to fix on the particular part we wish; but, they will do so, if the place be first cooled with a cloth dipped in cold water, or if it be moistened with cream or milk, and they are confined in the situation with a small glass. When they fall off, the bleeding may be promoted, if necessary, by fomenting the part.

SCARIFICATION WITH A LANCET

is mostly done in cases of inflamed eyes. An assistant is to raise the upper eye-lid, while the surgeon himself depresses the lower one, and makes a number of slight scarifications, where the vessels seem most turgid, trying particularly to cut the largest completely across.

DRY-CUPPING.

We may here mention this simple operation, performed by rarifying the air in a cupping-glass, as above directed, and then applying the vessel to the part affected. A cupping-glass, furnished with a syringe, might answer for this purpose. I think this operation is now not much used in this country: a proof that it is not a very efficacious measure.

ILL CONSEQUENCES SOMETIMES FOLLOWING BLEEDING IN THE ARM.

1. *Ecchymosis.*

The most common is a thrombus, or ecchymosis, a small tumour around the orifice, and occasioned by the blood insinuating itself into the adjoining cellular substance, at the time when this fluid is flowing out of the vessel. Changing the posture of the arm will frequently hinder the thrombus from increasing in size, so as to obstruct the evacuation of blood. But, in some instances, the tumour suddenly becomes so large, that it entirely interrupts the operation, and prevents it from being finished. In these cases, however, the most effectual method of preventing the tumour from becoming still larger, is to remove the bandage. By allowing the bandage to remain, a very considerable swelling may be induced, and such as might be attended with great trouble. If more blood be required to be taken away, it ought to be drawn from another vein, and, what is still better, from a vein in the other arm.

The best applications for promoting the absorption of these tumours, are those containing spirit, vinegar, or sal ammo-

niac. Compresses, wetted with any lotion of this sort, may be advantageously put on the swelling, and confined there with a slack bandage.

2. *Inflammation of the Integuments and subjacent cellular Substance.*

Mr. Abernethy says, that the inflammation and suppuration of the cellular substance, in which the vein lies, is the most frequent occurrence. On the subsidence of this inflammation, the tube of the vein is free from induration. Sometimes the inflammation is somewhat indolent, producing a circumscribed, and slowly suppurating tumour. Sometimes it is more diffused, and partakes of the erysipelatous nature. On other occasions, the affection is of the phlegmonous kind.

When the lancet has been bad, so as rather to have lacerated, than cut the parts; when the constitution is irritable, and especially, when care is not taken to unite the edges of the puncture, and the arm is allowed to move about, so as to make the two sides of the wound rub against each other; inflammation will most probably ensue. The treatment of this case consists in keeping the arm perfectly at rest in a sling, applying the saturnine lotion, and giving one or two mild saline purges. When suppuration takes place, a small poultice is the best local application.

3. *Absorbents inflamed.*

Sometimes, particularly when the arm is not kept properly quiet after bleeding, swellings make their appearance about the middle of the arm, over the large vessels, and on the fore-arm, about the mid-space, between the elbow and wrist, in the integuments covering the flexor muscles. The swelling at the inner edge of the biceps is sometimes as large as an egg. Before such swellings take place, the wound in the vein often inflames, becomes painful and suppurates, but without any perceptible induration of the venal tube, either at this time, or after the subsidence of the inflammation. Pains are felt shooting from the orifice in lines, up and down the arm, and upon pressing in the course of this pain, its degree is increased. On examining the arm attentively, indurated absorbents may be plainly felt leading to the tumour at the side of the biceps muscle.

The pain and swelling often extend to the axilla, where the glands also sometimes enlarge. Chord-like substances, evidently absorbents, may sometimes be felt, not only leading from the puncture to the swelling in the middle of the arm, but also from this latter situation up to the axillary glands, and from the wound in the vein down to the enlarged glands of the mid space between the elbow and wrist, over the flexor muscles of the hand.

The enlarged glands very often proceed to suppuration, and the patient suffers febrile symptoms. Some may suspect that the foregoing consequences may arise from the lancet being envenomed, and from the absorption of the virulent matter; but the frequent descent of the disease to the inferior absorbents militates against this supposition.

When the absorbents become inflamed, they quickly communicate the affection to the surrounding cellular substance. These vessels, when indurated, appear like small chords, perhaps of one eighth of an inch in diameter: this substance cannot be the slender sides of the vessels, suddenly increased in bulk, but an induration of the surrounding cellular substance.

The inflammation of the absorbents, in consequence of local injury, is deducible from two causes: one, the absorption of irritating matter; and the other, the effect of the mere irritation of the divided tube. When virulent matter is taken up by the absorbents, it is generally conveyed to the next absorbent gland, where its progress being retarded, its stimulating qualities give rise to inflammation, and, frequently, no evident disease of the vessel, through which it has passed, can be distinguished.

When inflammation of the absorbents happens in consequence of irritation, the part of the vessel nearest the irritating cause, generally suffers most, while the glands, being remotely situated, are not so much inflamed.

The treatment of the preceding case consists in keeping the arm perfectly quiet in a sling, dressing the puncture of the vein with any mild simple salve, covering the situation of the inflamed lymphatics with linen wet with the saturnine lotion, and giving some gentle purging medicine.

When the glandular swellings suppurate, poultices should be applied, and if the matter does not soon spontaneously make its way outward, the surgeon may open the abscess. (See *Mr. Abernethy's Essay on this subject.*)

4. *Inflammation of the Vein.*

The vein itself is very likely to inflame, when the wound does not unite. This affection will vary in its degree, extent, and progress. One degree of inflammation may only cause a slight thickening of the venal tube, and an adhesion of its sides. Abscesses, more or less extensive, may result from an inflammation of greater violence, and the matter may sometimes become blended with the circulating fluids, and produce dangerous consequences, or the matter may be quite circumscribed,

and make its way to the surface. When the vein is extensively inflamed, a good deal of sympathetic fever is likely to ensue, not merely from the excitement, which inflammation usually produces, but also in consequence of the irritation continued along the membranous lining of the vein to the heart. If, however, the excited inflammation should fortunately produce an adhesion of the sides of the vein to each other, at some little distance from the wounded part, this adhesion will form a boundary to the inflammation, and prevent it spreading further. The effect of the adhesive inflammation in preventing the extension of inflammation along membranous surfaces has been ably explained by Mr. Hunter. In one case, Mr. Hunter applied a compress to the inflamed vein, above the wounded part, and he thought that he thus succeeded in producing an adhesion, as the inflammation was prevented from spreading further. When the inflammation does not continue equally in both directions, but descends along the course of the vein, its extension in the other direction is probably prevented by the adhesion of the sides of the vein to each other. (See *Mr. Hunter's Paper in the Med. and Chirurg. Transactions, Vol.* 1.)

Mr. Abernethy mentions his only having seen three cases, in which an inflammation of the vein succeeded venesection. In neither of these did the vein suppurate. In one, about three inches of the venal tube inflamed both above and below the puncture. The integuments over the vessel were very much swollen, red, and painful, and there was a good deal of fever, with a rapid pulse, and furred tongue. The vein did not swell, when compressed above the diseased part. In another instance, the inflammation of the vein did not extend towards the heart, but only downward, in which direction it extended as far as the wrist.

The treatment is to lessen the inflammation of the vein, by the same means, which other inflammations require, and to keep the affection from spreading along the membranous lining of the vessel, towards the heart, by placing a compress over the vein, a little way above the puncture, so as to make the opposite sides of the vessel adhere together.

Mr. Abernethy can conceive a case, in which the vein may even suppurate, and a total division of the vessel might be proper, not merely to obviate the extension of the local disease, but to prevent the pus from becoming mixed with the circulation.

Might it not be better to put a ligature under the suppurating vein, above the affected part of the vessel? This plan would be quite effectual, without the objection of hemorrhage.

5. Inflammation of the Fascia of the Fore-arm.

Sometimes, in consequence of the inflammation arising from the wound of the lancet in bleeding, the arm becomes very painful, and can hardly be moved. The puncture often remains unhealed, but, without much inflammation of the surrounding integuments. The fore-arm and fingers cannot be extended without great pain. The integuments are sometimes affected with a kind of erysipelas; being not very painful, when slightly touched, but when forcibly compressed, so as to affect the inferior parts, the patient suffers a good deal. The pain frequently extends towards the axilla and acromion; no swelling, however, being perceptible in either direction. These symptoms are attended with considerable fever. After about a week, a small superficial collection of matter sometimes takes place, a little below the internal condyle: this being opened, a very little pus is discharged, and there is scarcely any diminution of the swelling or pain. Perhaps, after a few days more, a fluctuation of matter is distinguished below the external condyle, and this abscess being opened, a great deal of matter gushes from the wound, the swelling greatly subsides, and the patient's future sufferings are comparatively trivial.

The last opening, however, is often inadequate to the complete discharge of the matter, which is sometimes originally formed beneath the fascia, in the course of the ulna, and its pointing at the upper part of the arm depends on the thinness of the fascia in this situation. The collection of pus descends to the lower part of the detached fascia, and a depending opening for its discharge becomes necessary. This being made, the patient soon gets well.

In these cases, neither the vein, nor the absorbents, appear inflamed. The integuments are not much affected, and the patient complains of a tightness of the fore-arm. Matter does not always form, and the pliability of the arm, after a good while, gradually returns again.

Mr. Watson relates a case, which was followed by a permanent contraction of the fore-arm. Mr. Abernethy is of opinion, that a similar contraction of the fore-arm, from a tense state of the fascia, may be relieved by detaching the fascia from the tendon of the biceps, to which it is naturally connected. Mr. Watson seems to have obtained success in his first case, by having cut this connexion.

The treatment of an inflamed fascia, in consequence of venesection, has in it no peculiarity. General means for the cure of inflammation should be employed. The limb should be kept quiet, and the

inflamed part relaxed. As soon as the inflammation abates, the extension of the fore-arm and fingers ought to be attempted, and daily performed, to obviate the contraction, which might otherwise ensue. (*Abernethy.*)

Mr. Charles Bell objects to calling the affection an inflammation of the fascia, because he sees no proof of this part being inflamed, and he conceives that the symptoms proceed from the inflammation spreading in the cellular membrane, and passing down among the muscles, and under the fascia. The fascia acts as a bandage, and, from the swelling of the parts beneath, it binds the arm, but is not itself inflamed, and contracted. When necessary to divide the fascia, Mr. Charles Bell thinks it would be better to begin an incision near the inner condyle of the humerus, and to continue it some inches down the arm, rather than perform the nice, if not dangerous operation, of cutting the fascia, at the point, where the expansion goes off from the round tendon of the biceps.

When the elbow-joint and fore-arm continue stiff after all inflammation is over, Mr. C. Bell recommends frictions with camphorated mercurial ointment, &c. and the arm to be gradually brought into an extended state by placing a splint on the fore part of the limb. (*Operative Surgery, Vol.* 1, *p.* 65.)

6. *Ill Consequences of a wounded Nerve.*

Mr. Abernethy informs us, that Mr. Pott used to mention two cases, in which the patients had suffered distracting pains, followed by convulsions and other symptoms, which could only be ascribed to nervous irritation, arising from a partial division of the nerve, and he recommended its total division, as a probable remedy. Dr. Monro is said to relate similar cases, in which such treatment has proved successful.

Hence, it is highly necessary to know the characteristic symptoms of the case, particularly, as all the foregoing ones would be exasperated by the treatment just now alluded to. It is to Mr. Abernethy that we are indebted for several valuable remarks elucidating this subject. He informs us, that the two cutaneous nerves are those, which are exposed to injury. Most frequently all their branches pass beneath the veins, at the bend of the arm; but, sometimes, although the chief rami go beneath these vessels, many small filaments are detached over them, which it is impossible to avoid wounding in phlebotomy.

Mr. Abernethy thinks the situation of the median nerve, renders any injury of it very unlikely. If, however, a doubt should be entertained on this subject, an attention to symptoms will soon dispel it. When a nerve is irritated at any part, between its origin and termination, a sensation is felt, as if some injury were done to the parts, which it supplies. If, therefore, the cutaneous nerves were injured, the integuments of the fore-arm would seem to suffer pain; if the median nerve, the thumb, and two next fingers, would be painfully affected.—(*Abernethy.*)

What are the ills likely to arise from a wounded nerve? If it were partially cut, would it not, like a tendon, or any other substance, unite? It seems probable that it would do so, as nerves, as large as the cutaneous ones of the arm, are very numerous in various situations of the body, and are partially wounded in operations, without any peculiar consequences usually ensuing. The extraordinary pain sometimes experienced in bleeding, may denote that a cutaneous nerve is injured. The situation of the nervous branches is such, that they must often be partially wounded in the operation, though they probably unite again, in almost all cases, without any ill consequences. Yet, says Mr. Abernethy, it is possible that an inflammation of the nerve may accidentally ensue, which would be aggravated, if the nerve were kept tense, in consequence of its impartial division. Mr. Abernethy thinks the disorder arises from inflammation of the nerve, in common with the other wounded parts. Every one will admit that an inflamed nerve would be very likely to communicate dreadful irritation to the sensorium, and that a cure would be likely to arise from intercepting its communication with that organ.

The general opinion is, that the nerve is only partially divided, and that a complete division would bring relief. Mr. Pott proposed enlarging the original orifice. It is possible, however, that the injured nerve may be under the vein, and, if the nerve be inflamed, even a total division of it, at the affected part, would, perhaps, fail in relieving the general nervous irritation, which the disease has occasioned. To intercept the communication of the inflamed nerve with the sensorium, does, however, promise perfect relief. This object can only be accomplished by making a transverse incision above the orifice of the vein. The incision need not be large, for the injured nerve must lie within the limits of the original orifice, and it need only descend as low as the fascia of the fore-arm, above which all the filaments of the cutaneous nerves are situated. As the extent of the inflammation of the nerve is uncertain, Mr. Abernethy suggests even making a division of the cutaneous nerve still further from the wound made in bleeding.

Examples are recorded, in which not only extraordinary pain was occasioned by the prick of the lancet; but, erysipelas of the skin seemed to be induced by the operation, ending in gangrene of the whole limb, and the death of the patient. (See *Richerand's Nosographie Chirurgicale, Tom.* 2, *p.* 390. *Edit.* 2.)

In former times, it was customary to refer many of the bad symptoms occasionally following venesection, to a puncture of the tendon of the biceps; but, this doctrine is now in a great measure renounced, the experiments of Haller having completely proved, that tendons and aponeuroses are, comparatively speaking, parts endued with little or no sensibility.

In the foregoing account, the various ill consequences occasionally arising, after venesection, are represented separately; no doubt, in some cases, they may occur together.

(See *Essay on the ill Consequences sometimes following Venesection, by J. Abernethy, F.R.S. Medical and Chirurgical Transactions, Vol.* 1. *Medical Communications, Vol.* 2. *Richerand's Nosographie Chirurgicale, Tom.* 2, *p.* 381. *Edit.* 2.)

BLEEDING. Effusion of blood from accidental wounds. (See *Hemorrhage.*)

BLE'NORRHAGIA, or *Blénorrhœa.* (from βλεννος, mucus, and ῥεω, to flow.) A discharge of mucus. Swediaur, who maintains, that the gonorrhœa is attended with a mucous, and not a purulent discharge, prefers the name of blenorrhagia for the disease. However, in treating of gonorrhœa, we shall find that this last appellation is itself not altogether free from objections.

BLEPHAROPTOSIS. (from βλεφαρον, the eyelid, and πτωσις, a falling down.) Called also *ptosis.* An inability to raise the upper eyelid. (See *Ptosis.*)

BLEPHARO'TIS. An inflammation of the eyelids.

BLEPHARO'XYSIS. (from βλεφαρον, the eyelid, and ξεω, to scrape.) Called also *Ophthalmoxystrum.* A brush for the eye, employed by the ancient surgeons, and made of the beards of barley or rye. It was drawn across the inside of the eyelids, with the same design as scarifications are now made.

BLEPHARO'XYSTON. An ancient instrument for examining the eye. A speculum oculi. Also, according to Paulus Ægineta, the specillum asperatum, or rasp-like probe.

BLINDNESS. This is an effect of many diseases of the eye. See, particularly, *Amaurosis; Cataract; Cornea, opacities of; Hydrophthalmia; Leucoma; Ophthalmy; Pterygium; Pupil, closure of; Staphyloma, &c.*

BLISTERS. Topical applications, which, when put on the skin, raise the cuticle in the form of a vesicle, filled with a serous fluid. Various substances produce this effect on the skin; but, the powder of cantharides is what operates with most certainty and expedition, and, is now invariably made use of for the purpose. The blister plaster is thus composed: ℞ *Cantharidum* lbj, *Emplastri ceræ* lbij, *Adipis suillæ præp.* lbss. The wax plaster and lard being melted, and allowed to become nearly cold, the powdered cantharides are afterwards to be added.

When it is not wished to maintain a discharge from the blistered part, it is sufficient to make a puncture in the cuticle to let out the fluid; but, when the case requires keeping up a secretion of pus, the surgeon must remove the whole of the detached cuticle with a pair of scissars, and dress the excoriated surface in a particular manner. Practitioners used formerly to mix powder of cantharides with an ointment, and dress the part with this composition. But, such a dressing not unfrequently occasioned very painful affections of the bladder, a scalding sensation in making water, and very afflicting stranguries. An inflammation of the bladder, ending fatally, has been thus excited. The treatment of such complaints consists in removing every particle of cantharides from the blistered part, making the patient drink abundantly of mucilaginous drinks, giving emulsions, and some doses of camphor.

These objections to the employment of salves, containing cantharides, for dressing blistered surfaces, led to the use of mezereon, euphorbium, and other irritating substances, which, when incorporated with ointment, form very proper compositions for keeping blisters open, without the inconvenience of irritating the bladder, like cantharides.

The favourite application, however, for keeping open blisters, is the powder of savine, which was brought into notice by Mr. Crowther, in the first edition of his book on the White Swelling. In the late edition, this gentleman remarks, that he was led to the trial of different escharotic applications, in the form of ointment, in consequence of the minute attention, which caustic issues demand; and among other things, he was induced to try powdered savine, from observing its effects in the removal of warts. Some of the powder was first mixed with white cerate, and applied as a dressing to the part, that had been blistered; but, the ointment ran off, leaving the powder dry upon the sore, and no effect was produced. Mr. Crowther next inspissated a decoction of savine, and mixed the extract with the ointment, which succeeded better, for it produced a great and permanent discharge. At last, after various

trials, he was led to prefer a preparation analogous to the unguentum sambuci P. L. and he now offers the following formula, as answering every desirable purpose: ℞ *Sabinæ recentis contusæ* lbij, *Ceræ flavæ* lbj, *Adipis suillæ* lbiv. *Adipe et cerâ liquefactis, incoque sabinam et cola.*

The difference of this formula from the one, which Mr. Crowther published in 1797, only consists in using a double proportion of the savine leaves. The ceratum sabinæ of Apothecary's Hall, he says, is admirably made: the fresh savine is bruised with half the quantity of lard, which is submitted to the force of an iron press, and the whole is added to the remainder of the lard, which is boiled until the herb begins to crisp; the ointment is then strained off, and the proportion of wax, ordered, being previously melted, is added. On the use of the savine cerate, immediately after the cuticle, raised by the blister, is removed, it should be observed, says Mr. Crowther, that experience has proved the advantage of using the application lowered by a half, or two-thirds, of the unguentum ceræ. An attention to this direction will produce less irritation, and more discharge, than if the savine cerate were used in its full strength. Mr. Crowther says also, that he has found fomenting the part with flannel wrung out of warm water, a more easy, and preferable way of keeping the blistered surface clean, and fit for the impression of the ointment, than scraping the part, as has been directed by others. An occasional dressing of the unguentum resinæ flavæ, he has found, a very useful application for rendering the sore free from an appearance of slough, or rather dense lymph, which has sometimes been so firm in its texture, as to be separated by the probe, with as much readiness, as the cuticle is detached after blistering. As the discharge diminishes, the strength of the savine dressing should be proportionally increased. The ceratum sabinæ must be used, in a stronger, or weaker degree, in proportion to the excitement produced on the patient's skin. Some require a greater stimulus, than others, for the promotion of the discharge, and this can only be managed by the sensations, which the irritation of the cerate occasions.

Mr. Crowther has used ointments, containing the flowers of the clematis recta, the capsicum, and the leaves of the digitalis purpurea. The two first produced no effect: the last was very stimulating; and Mr. Crowther mentions his intention to take the first convenient opportunity to determine its qualities more accurately. He has also used kali purum, rubbed down with spermaceti cerate, in the proportion of one dram to an ounce: it proved very stimulating, but produced no discharge. He has tried one dram of the hydrargyrus muriatus mixed with two ounces of the above cerate; but, the application was so intolerably painful, that Mr. Crowther was sent for at the end of two hours, and found it necessary immediately to remove the dressing. The patient was attacked with the most severe ptyalism Mr. Crowther ever witnessed. (*Practical Observations on the White Swelling, &c. a new edition, by B. Crowther,* 1808.)

Instead of keeping a blister open, it is frequently a judicious plan to renew the application of the emplastrum lyttæ (the new name now adopted for blistering plaster) after healing up the vesication first produced, and to continue, in this manner, a succession of blisters, at short intervals, as long as the circumstances of the case may demand.

BOIL. See *Furunculus.*

BORBORY'GMUS. A rumbling sound, occasioned by air in the intestines.

BO'THRION, or *Bóthrion.* A very small superficial ulcer of the cornea.

BO'TIA. The disease called Scrofula.

BO'TIUM. A swelling of the thyroid gland. See *Bronchocele.*

BOUGIE. (French for Wax Candle.) This signifies an instrument somewhat resembling a straight piece of wax-taper, and the chief use of which is to remove obstructions in the urethra, by being introduced into this canal. The composition, of which they are made, ought, in particular, to possess a certain degree of suppleness, combined with a good deal of firmness.

Scultetus, a practitioner and writer of great note, at Ulm, in Germany, about the middle of the seventeenth century, was not ignorant of the manner of making and using bougies, in diseases of the urethra, as appears in his Armamentarium Chirurg. tab. 13, fig. 9, 10. And from his invention, as Mr. Gooch has observed, it is not at all improbable, that Daran may have taken the hint, and improved upon it.

The making of bougies has now become so distinct a trade, that some surgeons may consider it superfluous to treat of the subject in this dictionary. However, though a surgeon may not actually choose to take the trouble of making bougies himself, he ought certainly to understand how they ought to be made. Swediaur recommends the following composition: ℞ Ceræ flavæ lbj, Spermatis ceti ʒiij, Cerussæ acetatæ ʒv. These articles are to be slowly boiled together, till the mass is of proper consistence. Mr. B. Bell's bougie plaster is thus made: ℞ Emplastri lythargyri ʒiv, Ceræ

flavæ ℥iss, Olei Olivæ ℥iij. The two last ingredients are to be melted in one vessel, and the litharge plaster in another, before they are mixed. In Wilson's Pharmacopœia Chirurgica, I observe this formula: ℞ Olei Olivæ lbiiss, Ceræ flavæ lbj, Minii lbiss. Boil the ingredients together over a slow fire, till the minium is dissolved, which will be in about four or six hours. The composition for bougies is now very simple, as modern surgeons place no confidence in the medicated substances, formerly extolled so much by the famous Daran. The linen, which may be considered as the basis of the bougie, is impregnated with the composition alluded to, and which we see is generally made of wax and oil, rendered somewhat firmer by a proportion of resin. Some saturnine preparation is commonly added, as the urethra is in an irritable state, and the mechanical irritation might otherwise increase it. Of whatever composition bougies are made, they must be of different sizes, from that of a knitting-needle to that of a large quill, and even larger. The common ones are made in the following manner. Having spread any composition, chosen for the purpose, on linen rag, cut this into slips, from six to ten inches long, and from half an inch, to an inch, or more in breadth. Then dexterously roll them on a glazed tile into the proper cylindrical form. As the end of the bougie, which is first introduced into the urethra, should be somewhat smaller than the rest, the slips must be cut rather narrower in this situation, and, when the bougies are rolled up, that side must be outward, on which the plaster is spread.

Mons. Daran, and some others, attributed the action of their bougies to the composition used in forming them. Mr. Sharp apprehended that their efficacy was chiefly owing to the pressure, which they made on the affected part; and Mr. Aikin adds, that as bougies of very different compositions succeed equally well in curing the same diseases in the urethra, it is plain, that they do not act from any peculiar qualities in their composition, but by means of some common property, probably, their mechanical form.

There certainly is a great objection to making bougies of very active materials; because the healthy, as well as the diseased, parts are exposed to their action. Hence, surgeons now prefer the common bougies, made of a simple unirritating composition.

Plenck recommended bougies of catgut, which may be easily introduced even into a urethra greatly contracted, as their size is small, their substance firm, and they dilate with moisture. It is objected to catgut, however, that it dilates very much beyond the stricture, and gives great pain on being withdrawn.

The elastic resin has been employed for this purpose with great success, as it unites firmnes and flexibility. The resin is moulded on catgut by some secret method. Mr. Wilson, in his Pharmacopœia Chirurgica, seems to suggest, with much appearance of probability, that the secret consists in finding a suitable solvent for the Indian gum. As this substance, if dissolved in æther, completely recovers its former elasticity, upon the evaporation of this fluid, it is supposed that æther would answer the purpose, though rather too expensive. The catgut is coated with the elastic matter by being repeatedly dipped in it. Elastic gum bougies are in many cases highly serviceable, though their surface soon becomes rough, and they are expensive.

Mr. Smyth, apothecary, of Tavistock-street, has discovered a metallic composition, of which he forms bougies, to which some practitioners impute very superior qualities. These bougies are flexible, have a highly polished surface, of a silver hue, and possess a sufficient degree of firmness for any force, necessary in introducing them for the cure of strictures in the urethra. The advocates for the metallic bougies assert, that the short time they have been employed has convinced them, that such instruments exceed any bougies, which have yet been invented, and are capable of succeeding in all cases, in which the use of a bougie is proper. They are made either solid, or hollow, and answer extremely well as catheters; for, they not only pass into the bladder with ease, but may also be continued there for any convenient space of time, and hence produce the most essential benefit. The bougies certainly do not swell with moisture. The greatest objection, which has been urged against them, is, that they are attended with a risk of breaking. I have heard of an eminent surgeon being called upon to cut into the bladder, in consequence of a metallic bougie having broken, and a piece of it got into that organ, where it became a cause of the severe symptoms, which are commonly the effect of a stone in the bladder. It has also been objected to metallic bougies, that, although they are sufficiently flexible, they are quite destitute of elasticity.

See Sharp's Critical Enquiry, ch. 4. Aikin on the external use of Lead. Bell's Surgery, Vol. 2. 20, &c. White's Surgery, 371.

The bougie, with its application, says Mr. Hunter, is perhaps one of the greatest improvements in surgery, which these

last thirty, or forty years have produced. When I compare the practice of the present day, with what it was in the year 1750, I can scarcely be persuaded, that I am treating the same disease. I remember, when, about that time, I was attending the first hospitals in the city, the common bougies were, either a piece of lead, or a small wax candle, and, although the present bougie was known then, the due preference was not given to it, nor its particular merit understood, as we may see from the publications of that time.

Daran was the first, who improved the bougie, and brought it into general use. He wrote professedly on the diseases for which it is a cure, and also of the manner of preparing it; but, he has introduced so much absurdity in his descriptions of the diseases, the modes of treatment, and of the powers and composition of his bougies, as to create disgust.

When Daran published his observations on the bougie, every surgeon set to work to discover the composition, and each conceived, that he had found it out, from the bougies, which he had made, producing the effects described by Daran. It never occurred to them, that any extraneous body, of the same shape and consistence, would do the same thing.

(*Treatise on the Venereal Disease*, *p.* 116, *by John Hunter*, 1788.)

Of armed bougies, and of the manner of using bougies in general, we shall speak in the article *Urethra, Strictures of.*

BRACHERIUM. A truss or bandage for hernia. A word used by the barbarous Latin writers, and said to be derived from *brachiale*, a bracelet.

BRAIN. (For concussion, compression of, &c. see *Head, Injuries of*; for the hernia of, see *Hernia Cerebri.*)

BREAST. (See *Mammary Abscess*; *Mamma, Removal of*; *Cancer*; &c.)

BRONCHOCELE. (from βρογχος, the windpipe, and κηλη, a tumour.) Also called *botium*, or *bocium*. The Swiss call the disease *gotre*. Some have called it, *hernia gutturis*, *guttur tumidum*, and *trachelophyma*, *gossum*, *exechebronchos*; *gongrona*, *hernia bronchialis*. Heister thought it should be named *tracheocele*. Prosser, in his late publication on this disorder, from its frequency on the hilly parts of Derbyshire, calls it, with others, the *Derbyshire neck*; and, not satisfied respecting the similitude of this tumour to that observed on the necks of women on the Alps, the *English Bronchocele.*

Modern surgeons constantly mean by *bronchocele*, an enlargement of the thyroid gland. This sometimes attains such a magnitude, that it not only occupies all the space from one angle of the jaw to the other, but also, forms a considerable proje tionon each side of the neck, advancing forward a good way beyond the chin, and forming an enormous mass, which hangs down over the chest. The swelling, which is more or less unequal, is commonly not particularly hard, especially when the disease is not in a very advanced state; however, no fluctuation is perceptible, and the patients suffer no pain. The skin retains nearly its ordinary colour; but, when the tumour is of very long standing, and great size, the veins of the neck become more or less varicose.

According to Prosser, the tumour generally begins between the eighth and twelfth year. It enlarges slowly during a few years, till, at last, it augments rather rapidly, and forms a bulky pendulous tumour. Women are far more subject to the disease, than men, and the tumour is observed to be particularly apt to increase rapidly during their confinement in childbed. When only one lobe of the thyroid gland is affected, it may extend in front of the carotid artery, and be lifted up by each diastole of this vessel, so as to appear to have the pulsatory motion of an aneurism. (*A. Burn's Surgical Anatomy of the Head and Neck*, *p.* 195, *and Parisian Chirurgical Journal*, *Vol.* 2, *p.* 292—293.)

It is this disease, to which the term *gotre*, or *goitre*, has been particularly applied, and which is so common in some of the valleys of the Alps. Indeed, there are certain places, where the disease is so frequent, that hardly an individual is totally exempt from it. Larrey, in travelling through the valley of Maurienne, noticed, that almost all the inhabitants were affected with goitres, of different sizes, by which tumours, the countenance was deformed, and the features rendered hideous. (*Mémoires de Chirurgie Militaire*, *Tom.* 1. *p.* 123.) In many, the swelling is so enormous, that it is impossible to conceal it by any sort of clothing. A state of idiotism is another affliction, which is sometimes combined with the *goitre*, in countries, where the latter affection is endemic. However, all, who have the disease, are not idiots, or cretins as they have been called, and in Switzerland, and elsewhere, it is met with in persons who possess the most perfect intellectual faculties. Where bronchocele and cretinism exist together, Foderé, and several other writers ascribe the affection of the mind to the state of the thyroid gland. (See *Essai sur le Goitre et Cretinisme*, *par M. Foderé.*) This opinion, however, appears to want foundation, since the mental faculties are from birth weak, and, in many, the idiotism is complete, where there is no enlargement of the thyroid gland, or where the tumour is not bigger than a walnut, so that no

impediment can exist to the circulation to, or from the brain. (*Burns on the Surgical Anatomy of the Head and Neck, p.* 192.) The direct testimony of Dr. Reeve also proves, that, in the countries, where cretins are numerous, many people of sound and vigorous minds have bronchocele. (See *Dr. Reeves's Paper on Cretinism, Edinb. Med. and Surgical Journal, Vol.* 5, *p.* 31.) Hence, as Mr. A. Burns has remarked, the combination of bronchocele and cretinism must be considered as accidental; a truth, that seems to derive confirmation from the fact, that, in some parts of this country, bronchocele is frequent, where cretinism is seldom or never seen. The bronchocele seems to be endemic in several mountainous countries, particular Switzerland, Savoy, Tyrol, Derbyshire, &c. and it occurs remarkably often in young subjects, and much more frequently in the female, than the male sex. In women, it usually makes its appearance at an early age, generally between the eighth and twelfth year, and it continues to increase gradually for three, four, or five years, and is said sometimes to enlarge more, during the last half year, than for a year, or two, before. It does not generally rise so high as the ears, as in the cases mentioned by Wiseman, and it is rather in a pendulous form, not unlike, as Albucasis says, the flap, or dewlap of a turkey-cock, the bottom being the largest part of the tumour. It is soft, or rather flabby to the touch, and somewhat moveable, but, after a few years, when it has ceased enlarging, it becomes firmer, and more fixed. When the disease is very large, it generally occasions a difficulty of breathing, which is increased on the patient's catching cold, or attempting to run. In some subjects, the tumour is so large, and affects the breathing so much, that a loud wheezing is occasioned; but, there are many exceptions to this remark. Sometimes, when the swelling is of great size, patients suffer very little inconvenience; while others are greatly incommoded, though the tumour is small. In general, the inconvenience is trivial. The voice is occasionally rendered hoarse. In some instances, only one lobe of the thyroid gland is affected.

The causes of the bronchocele are little known. To the opinion, that bronchocele is caused by the earthy impregnation of water used for drink, the following objections offer themselves. 1. The water of Derbyshire, in districts, where this disease is considered endemic, contains much supercarbonate of lime; but that in common use about Nottingham, where the disease is also prevalent, is impregnated with sulphate of lime. 2. Abstinence from water unboiled does not diminish, nor interrupt the gradual progress of the disease. 3. Patients are cured of the disease, who still continue to drink water from the same source as before, without taking any precaution, as boiling, &c. 4. The disease is seldom found among men. 5. Many instances may be related of a swelling in the neck, sometimes very painful, and generally termed bronchocele, being produced very suddenly, by difficult parturition, violent coughing, or any other unusually powerful effort. (See *Edinb. Med. and Surgical Journal. Vol.* 4, *p.* 279.) The disease is sometimes seen in scrofulous subjects; but, it may be quite independent of the other disorder. On the mountainous parts of Derbyshire, Genoa, and Piedmont, they attribute the bronchocele to drinking water cooled with ice. To this theory, many of the objections, concerning the earthy impregnation of water, stand in full force; with this additional reflection, that, "In Greenland, where snow water is commonly used, these unsightly protuberances are never met with, nor, (says Watson) did I ever see one of them in Westmoreland, where we have higher mountains, and more snow, than they have in Derbyshire, in which county, they are very common. But what puts the matter beyond a doubt, is, that these wens are common in Sumatra, where there is no snow, during any part of the year." (*Watson's Chemical Essays, Vol.* 2, *p.* 157.)

Respecting the influence of particular water in bringing on the disease, Dr. Odier, the well informed professor of medicine, at Geneva, seems to give credit to the opinion, because, it has appeared to him, that distilled water prevented the increase of the tumour, and even tended to lessen its bulk. (See *Manuel de Médecine Pratique.*) However, without denying this power of distilled water, I think the foregoing consideration satisfactorily proves, that the disease neither proceeds from snow water nor water impregnated with particular salts.

An observation lately made by an intelligent writer, would lead one to conclude, that cretinism depends upon malformation of the head. Speaking of goitre, as it appears among the inhabitants of the valley of Maurienne, M. Larrey informs us, that, in many of these people, with this frightful deformity is joined that of the cranium, of which the smallness and excessive thickness are especially remarkable. (*Memoires de Chirurgie Militaire, Tom.* 1, *p.* 123.) Dr. Leake thinks, that tumours of this sort, may be owing to the severity of the cold damp air, as they generally appear in winter, and hardly ever in the warm dry climates of Italy and Portugal. Mr. Prosser is in-

clined to consider the bronchocele, as a kind of dropsy of the thyroid gland, similar to the dropsy of the ovary, and he mentions, that Dr. Hunter dissected one thyroid gland, which had been considerably enlarged, and contained many cysts filled with water. These, he erroneously concludes, must have been hydatids. Dr. Baillie remarks, that when a section is made of the thyroid gland, affected with this disease, the part is found to consist of a number of cells, containing a transparent viscid fluid.

The ordinary bronchocele is, in all probability, entirely a local disease, patients usually finding themselves, in other respects, perfectly well. The tumour itself frequently occasions no particular inconvenience, only deformity. There is no malignancy in the disease, and the swelling is not prone to inflame, or suppurate, though, as Dr. Hunter remarks, abscesses do occasionally form in it. Bronchoceles never become cancerous. Mr. Gooch never knew life to be endangered by this sort of tumour, however large; but, he saw great inconvenience arise from it, when combined with quinsy. Dr. Hunter says, that the bronchocele appears two, or three years before, or after the commencement of menstruation, and that it sometimes spontaneously disappears, when this evacuation goes on in a regular manner. Mr. Prosser thinks, that this change in the constitution hardly ever affects the tumour.

It is a curious fact, that the inhabitants of the valleys of the Alps are particularly liable to bronchocele, while those, who live in higher situations on the mountains, escape the disease.

TREATMENT OF BRONCHOCELE.

A blister, kept open, has put a stop to the growth of the tumour; but, this method is not much followed at present, as a better plan of treatment has been discovered. The most famous mode of curing the bronchocele is by giving internally burnt sponge, and occasionally, a calomel purge, at the same time, employing frictions to the tumour itself.

The efficacy of burnt sponge is said to be most conspicuous, when this medicine is exhibited in the form of a lozenge, composed of ten grains of this substance, ten of burnt cork, and the same quantity of pumice-stone. These powders are to be made into the proper form with a little syrup, and the lozenge is then to be put under the tongue and allowed to dissolve there. To the latter circumstance, much importance is attached. Other practitioners give a scruple of the burnt sponge alone, thrice every day, while some add a grain of calomel to each dose. A purge of calomel should be ordered about once a week, or fortnight, as long as the patient perseveres in the use of the calcined sponge; but, if mercury be combined with each dose of this medicine, no occasional purgative will be requisite.

External means may very materially assist the above internal remedies. Frequently rubbing the swelling with a dry towel; bathing the part with cold water; rubbing the tumour two, or three times a day, with the aq. ammon. acet. or the camphor liniment; are the best steps of this kind which the surgeon can take.

"In the treatment of bronchocele," says Mr. A. Burns, "repeated topical detraction of blood from the tumour is highly beneficial. Electricity also has sometimes a marked effect; but, there is no remedy, which I would more strongly advise, than regular and long continued friction over the tumour. By perseverance in this plan, a bronchocele, treated in London, was materially reduced in the course of six weeks. Its good effects I have likewise witnessed myself; and it is a remedy highly recommended by Girard in his "*Traité des Loupes.*" It has also been much used in scrofulous tumours by Mr. Grosvenor of Oxford, and by Mr. Russel of Edinburgh." (*Surgical Anatomy of the Head and Neck, p.* 204.)

Mr. A. Burns recommends the friction to be made with flannel, covered with hair powder, and the part to be rubbed, at least, three times a day, for twenty minutes.

In two cases of bronchocele, related by Dr. Clarke, the patients were cured, by "the steady use of the compound plaster of ammoniac and mercury, conjoined with the internal exhibition of the burnt sponge, and occasional purgatives." (See *Edinb. Med. and Surgical Journal, Vol.* 4, *p.* 280.)

We learn from Professor Odier, that, in Geneva, the bronchocele is cured by burnt sponge, exhibited in powder, or infused in wine, and combined with purgatives to prevent the cramps of the stomach, which sometimes accompany the disappearance of the swelling. Muriate of barytes has likewise been recommended. (See *Manuel de Médecine Pratique.*)

A whole volume might be written on the various remedies, and plans of treatment, of the bronchocele. The limits of this work, however, demand more conciseness, and, having detailed the most approved practice, we shall be very brief on other proposals.

Mr. Wilmer, credulously imputing great influence to the changes of the moon, used to begin with an emetic, the day after the full moon, and to give a purge the day after that. The night following, and seven nights successively, he directed the above-mentioned lozenge to be put under

the tongue at bed-time, and administered every noon a bitter stomachic powder. On the eighth day, the purge was to be repeated, and, in the wane of the succeeding noon, the whole process, except the emetic, was renewed. (*Cases in Surgery, Appendix.*) This famous Coventry plan of treatment is said to be greatly assisted, by rubbing the tumour, with an ointment, containing tartar emetic.

Mr. Prosser succeeded with his medicines, though the patient was nearly twenty-five years old, and the swelling had existed more than twelve years. It is said, that no instance of cure has been known, after the patient was twenty-five.

Mr. Prosser orders one of the following powders to be taken early in the morning, an hour, or two after breakfast, and at five, or six o'clock in the evening, every day, for a fortnight, or three weeks. The powder may be taken in a little syrup, or sugar and water, or any thing else, so that none may be lost.

℞ Cinnab. ant. op. levigat. milleped. ppt. et pulv. a a gr. xv. Spong. calcin. ℈ M.

These powders should be taken for two, or three weeks, and left off for a week or nine days, before a repetition. At bed-time, every night, during the second course of the powders, some purgative pills, composed of mercury, the extractum colocynthid. comp. and rhubarb, are to be administered. In general it will be proper to purge the patient with manna, or salts, before beginning with the powders. Mr. Prosser puts no faith in external applications.

Some have recommended giving two scruples of calcined egg-shells, every morning, in a glass of red wine; half a dram of the kali sulphuratum, every day, dissolved in water; or ten, or fifteen drops of the *tinct. digit. purpur.* twice a day, the dose to be gradually increased. Muriated barytes; cicuta; and belladonna, have also been exhibited.

Attempts have been made to extirpate the enlarged thyroid gland; but, the numerous large arteries distributed to this part, the dilated state of these vessels, when the gland is much enlarged, and the vicinity of the carotid arteries, render this operation exceedingly dangerous, especially when the swelling is very large, the only instance, in which a patient would submit to this mode of cure. In doing it, one would be obliged to cut arteries large enough to pour forth a vast quantity of blood in a very short time, and so situated, that it would be difficult to tie, or effectually compress them. Mr. Gooch relates two cases, which do not encourage practitioners to have recourse to the excision of enlarged thyroid glands. In one of these instances, so copious an hemorrhage took place, that the surgeon, though equally bold and experienced, was obliged to stop in the middle of the operation. No means availed in entirely suppressing the bleeding, and the patient in a few days died. In the other example, the same event nearly took place, the patient's life only being saved by compressing the wounded vessels with the hand, day and night for a whole week, by persons who relieved each other in turn. The surgeon found this the only way of stopping the hemorrhage, after many fruitless attempts to tie the vessels.

Certainly these cases are well calculated to deter prudent men from undertaking the hazardous operation of cutting out an enlarged thyroid gland. The practice is the less proper for imitation, for, inconvenient as a bronchocele may be, it scarcely ever endangers life.

It must be noticed, however, that there are a very few cases of enormous bronchoceles, every now and then occurring, which obstruct respiration, deglutition, and the return of the blood from the head, in so serious a degree, that every enterprizing surgeon would feel greatly inclined to make any rational attempt to relieve his patient, even though it might be one of a bold description. In such pressing circumstances, a good operator, well acquainted with the anatomy of the neck, would be warranted in attempting the extirpation of the swelling, and he would be most likely to succeed by imitating the plan, which was followed by Desault, and which I shall hereafter particularly relate. (See *Thyroid Gland, Extirpation of.*)

Were a surgeon to be afraid of this attempt, and, were the symptoms urgent, he might adopt another line of conduct, which is, in every respect, rational and warrantable; namely, he might expose, and tie, the superior thyroideal arteries, just as is done in cases of aneurisms. When the quantity of blood, flowing into a tumour, is, suddenly, and, greatly, lessened, the size of the swelling commonly very soon undergoes a considerable diminution. This operation has been actually practised by Sir William Blizard, who tied the arteries of an enlarged thyroid gland, and, in a week, the tumour was reduced one-third in its size. The ligatures then sloughed off; repeated bleeding took place from the arteries, and by the extension of the hospital gangrene, the carotid itself was exposed. The patient died; yet, as Mr. A. Burns maintains, this does not militate against a repetition of the experiment; the same thing might have happened from merely opening a vein, and, in the confined air of an hospital, has actually happened. (*Surgical Anatomy of the Head and Neck*, p.

202.) For my own part, I am decidedly of opinion, that the great decrease in the size of the gland before death, is a sufficient encouragement to repeat the trial, particularly, as the mode of tying arteries is now brought to the greatest perfection. If the femoral, and even the external iliac, arteries will heal, when tied in Mr. Abernethy's method, there can be no doubt, that the superior thyroideal is capable of doing so.

Recent bronchoceles may often be cured by proper medicines and applications; inveterate ones may generally be diminished, but, they hardly ever can be entirely removed.

It is somewhat extraordinary, that, notwithstanding there are so many recorded instances of the bronchocele being cured, Richerand, in his late work, should have set down the disease as totally incurable, either by external applications, or internal medicines. (See his *Nosographie Chirurgicale, Tom.* 4, *p.* 149. *Edit.* 2.)

Albucasis gave the first good account of the bronchocele. His remarks are translated in Friend's Hist. of Physic, and James's Med. Dic. (See also *Turner's Surgery, Vol.* 1, *p.* 164. *Wilmer's Cases and Remarks in Surgery. Prosser on Bronchocele, Edit.* 3. *Bell's Surgery, Vol.* 5. *White's Surgery. Memoirs of the Med. Society of London,* 217. *Gooch's Chirurgical Works, Vol.* 2, *p.* 96.—*Vol.* 3, *p.* 157. *Desault's Parisian Chirurgical Journal, Vol.* 2, *p.* 292. *Œuvres Chirurgicales de Desault, par Bichat, Tom.* 2, *p.* 298. *Edinb. Med. and Surgical Journal, Vol.* 4, *p.* 279. *Odier's Manuel de Médecine Pratique. Dr. Reeves's Paper on Cretinism, in Edinb. Med. and Surgical Journal, Vol.*5. *Essai sur le Goitre et Cretinisme, par M. Foderé. Richter's Anfangsgrunde der Wundarzneykunst, Band.* 4. *Zweyter Auflage, Kap.* 13, *Vom Kropfe. Surgical Anatomy of the Head and Neck, by A. Burns, p.* 191, *&c. Larrey, Memoires de Chirurgie Militaire, Tom.* 1, *p.* 123. *Tom.* 3, *p.* 199, *&c.*)

BRONCHOTOMY. (from βρογχος, the windpipe, and τεμνω, to cut.) This is an operation, by which an opening is made into the larynx, or trachea, either for the purpose of making a passage for the air into, and out of, the lungs, when any disease prevents the patient from breathing through the mouth and nostrils; or of extracting foreign bodies, which have accidentally fallen into the trachea; or, lastly, in order to be able to inflate the lungs in cases of sudden suffocation, drowning, &c.

The operation is also named *tracheotomy*, or *laryngotomy*. Its practicableness, and little danger, are founded on the facility, with which certain wounds of the windpipe, even of the most complicated kind, have been healed, without leaving any ill-effects whatever, and on the nature of the parts cut, which are not furnished with any vessel of consequence.

This operation is proper in several cases, and requires being differently practised, according to a variety of circumstances. It is not at all a dangerous proceeding, *dummodo* (says Fabricius ab Aquapendente) *qui secat sit anatomes peritus, quia sub hoc medico et artifice, omnia tutissimè et felicissimè peraguntur.*

1. Bronchotomy, we have said, is occasionally performed, to enable the patient to breathe, when respiration through the mouth and nostrils is impeded by disease.

Quinsy is an affection sometimes creating a necessity for the operation; but, of all those cases, which Boerhaave has described, and of which his learned commentator has said so much, there is only that, which is named *strangulans*, for which bronchotomy is indispensable. This species of quinsy presents no visible symptom, neither in the throat nor the pharynx. The examination of the dead subject proves, that the disease is situated in the edges of the rima glottidis, which opening becomes so contracted as scarcely to leave the smallest space. For this reason, and on account of the tension of the ligaments of the glottis, the voice is rendered excessively acute, and hissing as it were. The suffocation is imminent; the lungs not being expanded, the blood accumulates, in these organs, and there is an impediment to the return of the blood from the head through the jugular veins. Hence, a plethoric state of the brain is occasioned. Considering all these circumstances, some have inferred, that many of the patients, who have thus perished, might have been saved by making a timely opening into the trachea. All writers, who have treated of bronchotomy in cases of quinsy, have invariably regarded this operation as the ultimate resource. Both the Greeks and Arabians were of this sentiment. In such cases, Avicenna only recommends bronchotomy in violent quinsies, when medicines have failed, and the patient must evidently die from the unrelieved state of the affection. Rhases also advised the operation only when the patient was threatened with death. Thus we see, that bronchotomy, which might be proper in regard to the object intended, became hurtful from the way, in which it was executed.

It was doubtless in consequence of the ill-success of the operation, that Paulus Ægineta observed: *In synanchicis quidem chirurgiam improbamus, cùm inutilis sit præcisio.* Bronchotomy, says M. Louis, will always be done too late, when only allowed as an extreme measure. The danger of perishing by suffocation, in cases of

quinsy, M. Louis remarks, has been known from the very dawn of medicine. The advice of Hippocrates, to remedy this urgent symptom, is a proof of it, and, he observes, that the danger is evinced when the eyes are affected and prominent, as in persons who have been strangled, when the face, the throat, and neck burn, without any thing appearing to be wrong on inspection. He recommends *fistulæ in fauces ad maxillas intrudendæ, quò spiritus in pulmonem trahatur.* No doubt, he would have advised more, had it not been for the doctrine of his time, that the wounds of cartilages were incurable.

This method, defective as it was, continued till Asclepiades, to whom we owe the invention of bronchotomy, if we may believe Galen. Since Asclepiades, this operation has always been recommended, and practised in cases of quinsy, threatening suffocation, notwithstanding the inculcation of Cælius Aurelianus, who treated it as fabulous. The mode of doing it, however, has not been well detailed by any who put it in practice, except by Paulus Ægineta, who is very precise and clear. "We must (says he) make the incision in the trachea, under the larynx, about the third or fourth ring. This situation is the most eligible, because it is not covered with any muscle, and no vessels are near it. The patient's head must be kept backward, in order that the trachea may project more forward. A transverse cut is to be made between two of the rings, so as not to wound the cartilage, only the membrane." The knowledge of this method, and its advantages in cases of the *angina strangulans*, when practised in time, ought, according to M. Louis, to have rendered its performance a general practice.

The convulsive angina of Boerhaave, which particularly affects those, who can only breathe well in an upright posture, has also been adduced as a case demanding the prompt performance of bronchotomy. Mead, in his *Præcepta et Monita Medica*, relates a case. The patient had been bled very copiously twice in the space of six hours, but he died notwithstanding this large evacuation. The same author took notice in Wales, especially, on the sea-coast, of an epidemic catarrhal quinsy, which carried the patients off in two or three days. In these instances, bleeding was not of much use, and bronchotomy, which was not performed, was the only means of saving the patients.

The practitioners of the present day are generally less sanguine in their expectation of benefit, in cases of angina and croup, than M. Louis was. From the observations of Dr. Cheyne, it would appear, that, in croup, the operation cannot be necessary for the purpose of admitting air into the trachea; for, in those, who have died of the disease, he has found a pervious canal, of two-eighths of an inch in diameter, and through a tube of such diameter, even an adult can support respiration for a considerable time. According to the same writer, bronchotomy is equally unfitted for the removal of the membrane formed by the effusion of lymph; for, from its extent, variable tenacity, and adhesions, this is, in almost every case, totally impracticable; and even could the whole membrane be removed, still the function of respiration would be but little improved, the ramifications of the trachea and bronchial cells remaining obstructed. (See *Cheyne's Pathology of the Larynx and Bronchia.*)

M. Pelletan joins the best modern writers, in representing bronchotomy, as generally useless in cases of croup: the only example, in which he thinks the operation might be serviceable, is where the disease is confined to the larynx, a case, which seems to be very uncommon, and difficult to distinguish. "*En supposant enfin l'angine avec concrétion bien caractérisée, on se trouvera encore entre la crainte de pratiquer une opération inutile, si les concrétions se prolongent jusque dans les bronches, et l'impossibilité de juger si ces concrétions sont bornées au larynx. C'est en effet dans ce seul cas que l'opération peut être fructueuse; elle facilitera la respiration pendant que la nature, aidée de l'art, travaillera à dissoudre, détacher, et faire expectorer les fausses membranes qui oblitèrent la glotte et le larynx.* (*Clinique Chirurgicale, Tom.* 1, *p.* 28.)

Dr. Baillie has recently published three cases, in which death was produced in the adult subject, and, in a very few days, by a violent inflammation of the larynx and trachea. The disease had a strong resemblance to croup; but, yet was different from it. There was not the same kind of ringing sound of the voice as in croup, and no layer of coagulable lymph was formed upon the surface of the inner membrane of the larynx and trachea, which, according to Dr. Baillie, uniformly attends the latter disease. In one of these cases, the cavity of the glottis was found to be almost obliterated, by the thickening of the inner membrane of the larynx at that part. The inner membrane of the trachea was likewise inflamed; but, in a less degree. The lungs were sound. If, in thirty hours, no relief should be derived from bleeding ad deliquium, and the exhibition of opiates, Dr. Baillie conceives, that, in this sort of case, it might be advisable to perform the operation of bronchotomy at the upper part of the trachea, just under the thyroid gland. This operation, he thinks, would probably enable the patient to breathe, till the inflammation in the larynx, more especially, at

the aperture of the glottis, had time to subside. (See *Transactions of a Society for the Improvement of Med. and Chirurgical Knowledge, Vol.* 3, *p.* 275—289.)

The compression of the trachea by foreign bodies, lodged in the pharynx, or by tumours, formed outwardly, and of sufficient size to compress the wind-pipe, is an equal reason for operating, more or less expeditiously, according to the symptoms. Mr. B. Bell mentions two instances of suffocation from bodies falling into the pharynx. Respiration was only stopped for a few minutes; but, the cases were equally fatal, notwithstanding the employment of all the usual means. This author thinks, there was every reason to believe, that bronchotomy would have been attended with the greatest success, if it had been performed in time, before the effects of the suffocation had become mortal. The operation should also be done, when the trachea is compressed by tumours. The author of the article *Bronchotomie*, in *l'Encyclopédie Méthodique*, says, that about twenty years ago, he opened a man, who had died of an emphysema, which came on instantaneously. He had had, for a long while, a bronchocele which was of an enormous magnitude towards the end of his life. The cavity of the trachea was so obliterated, that there was scarcely room enough to admit the thickness of a small piece of money. Doubtless, bronchotomy, performed before the emphysema made its appearance, would have prolonged this man's days.

In cases of this last decription, Desault would have advised the introduction of an elastic gum catheter into the trachea from the nose, in order to facilitate respiration. This practice, I believe, has not hitherto been attempted by English surgeons, though it has been repeatedly tried in France. (See *Œuvres Chirurgicales de Desault par Bichat, Tom.* 2, *p.* 236, &c.)

M. Habicot, in a treatise, intitled, *Quèstion Chirurgicale sur la Possibilité et la Necessité de la Bronchotomie*, mentions his having successfully performed this operation on a lad fourteen years old, who, having heard it said, that gold, when swallowed, did no harm, attempted to swallow nine pistoles, wrapped up in a piece of cloth, to hide them from thieves. The packet, which was very large, could not pass the narrow part of the pharynx; and here it lodged, so that it could neither be extracted, nor forced down into the stomach. The boy was on the point of being suffocated by the pressure, which the foreign body made on the trachea; and his neck and face were so swollen and black, that he could not have been known. M. Habicot, to whose house the patient was brought, attempted in vain, by different means, to dislodge the foreign body. At length, perceiving the patient in evident danger of being suffocated, he resolved to perform bronchotomy. This operation was no sooner done, than the swelling and lividity of the face and neck disappeared. M. Habicot pushed the pieces of gold down into the stomach with a leaden probe, and the pistoles were, at different times, discharged from the anus, eight or ten days afterwards. The wound of the trachea very soon became quite well. (See *Mem. de l'Acad. de Chirurgie, Tom.* 12, *p.* 243. *Edit. in* 12*mo.*)

In such a case, Desault would have introduced an elastic gum catheter into the larynx, instead of performing bronchotomy, which would not answer, were the foreign body low down. (See *Œuvres Chirurg. de Desault, Tom.* 2, *p.* 247.)

2. We have said, that foreign bodies in the trachea, may render it necessary to practise bronchotomy. M. Louis, in an excellent memoir, on extraneous substances in the trachea, has proved, more convincingly than all other preceding writers, the necessity of the operation in circumstances of this kind. The proofs are adduced in a case, which fell under his own observation, and which we shall quote.

On Monday, the 19th of March, 1759, a little girl, seven years old, playing with some dried kidney-beans, threw one into her mouth, and thought she had swallowed it. She was immediately attacked with a difficulty of breathing, and with a convulsive cough, which was very afflicting. The little girl said, she had swallowed a bean, and such assistance as was thought proper, was given her. Want of success was the cause of several surgeons being successively sent for, who vainly employed the different means, prescribed by art, for extracting foreign bodies from the œsophagus, or forcing them into the stomach. A fine sponge, cautiously fastened to the end of a whalebone probang, was repeatedly introduced through the whole extent of the œsophagus. The little girl, who made a sign with her finger, that the foreign body was situated in the middle of the neck, thought that she felt some relief, when the sponge was conveyed below the place which she pointed out. She had, every now and then, a violent cough, the efforts attending which produced convulsions in all her limbs. Deglutition was unobstructed; and warm water and oil of sweet almonds had been swallowed without difficulty. Two whole days had passed in sufferings, when the relations called M. Louis to render his assistance. The little girl, with all possible fortitude and sense, was several times held in her friend's arms, ready to die of suffocation. M. Louis, well aware

of what had happened, came into the room, where the patient was. She was sitting up in her bed, suffering no other symptom, than a very great difficulty of breathing. M. Louis enquired where she felt pain, and she made such a sign in reply, as left no doubt concerning the nature of the accident. She put the index finger of her left hand on the trachea, between the larynx and sternum. The fruitless attempts which had been made in the œsophagus, with a view of dislodging the foreign body; the nature and the smallness of this body, which was not such as would be stopped in the passage for the food; and the facility of swallowing, were negative proofs that the bean was not in the œsophagus. Respiration was the only function disturbed; it was attended with difficulty, and a rattling in the throat. The little girl expectorated a frothy fluid, and she pointed out so accurately the painful point where the object producing all her sufferings was situated, that M. Louis did not hesitate to declare to the relations, from this single inspection, that the bean was in the windpipe, and that there was only one way of saving the child's life, which was to make an incision, for the purpose of extracting the foreign body. He apprised them that the operation was neither difficult nor dangerous, that it had succeeded as often as it had been practised, and that the very pressing danger of the case only just allowed time to take the opinion of some other well-informed surgeons, respecting the indispensable necessity for such an operation. M. Louis thought this precaution necessary, in order to acquire the confidence of the parents, and to shelter himself from all reproach, in case the event of the case should not correspond with his hopes. M. Louis went home to prepare all the requisites for bronchotomy, and, in two hours, he was informed the surgeons, who were consulted, waited for him. Since M. Louis went away, the child had become quiet, and was lying on its side asleep. The opinion he had delivered, had been ill-explained by the friends and attendants, and had been discussed, before his return. They, who had been rendering their assistance, on the supposition, that the foreign body was in the œsophagus, evinced surprise at the proposal of extracting, by an operation, a substance, the presence of which, in any part of this tube was not obvious. M. Louis explained his advice, in regard to bronchotomy, and he did not expect a doubt to be set up against so positive a fact. The investigation of truth may authorize objections, to which those who make them, only give the value which is due; but M. Louis was asked concerning the possibility of the case. It was objected, that a substance as large as a bean could not insinuate itself into the trachea. He brought every one into his sentiment, by a short explanation of cases of this sort, with which he was himself acquainted. The little girl was examined, she was better, than when M. Louis saw her before, and a very palpable emphysema was seen above the clavicle, on each side of the neck, a symptom which did not exist two hours previously. This swelling made M. Louis conclude, that the urgency for the operation was still greater. The friends, whose confidence had been shaken by the opposition he had experienced in bringing about unanimity, were in the greatest embarrassment, when they were told, that the child might die of an operation, which he had represented as only a simple incision, free from all danger. M. Louis was repeatedly asked, if he would be responsible for the child's life during the operation, and he in vain replied, that if there were any thing to fear during the operation, it would be from the accident itself, and not from the assistance rendered. This distinction was not perceived, and M. Louis withdrew, at the same time refusing his consent to the exhibition of two grains of emetic tartar, the effect of which would be useless, and might be dangerous. The medicine was given in the night: the child was fatigued with its operation, and quite unbenefited. On Tuesday morning, M. Louis found the little girl very quiet, and they who had paid their visits before him, found her wonderfully well. The respiration, however, continued to be still attended with a rattling noise, which M. Louis had observed in the evening, when the breathing was much more laborious. The child was nearly suffocated several times in the course of the day, and died in the evening, three days after the accident.

M. Bordenave, who had seen the patient, informed M. Louis of the child's death on Friday. The body was opened, before a numerous assembly of persons. After making a longitudinal incision through the skin and fat, along the trachea, between the sterno-hyoidei muscles, M. Bordenave slit open the trachea, cutting three of its cartilages. This very instant, every one could see the bean, and M. Louis took it out with a small pair of forceps. It was manifest, from the case, with which this foreign body was extracted, that the operation would have had, on the living subject, the most salutary effect. The relations had to regret having sacrificed a child, which was dear to them, to an irresolution and a timidity, which the most persuasive arguments could not remove. (*Mem. de l'Acad. Royale de Chirurgie, Tom.* 12, *p.* 293, *&c. Edit. in* 12*mo.*)

This case evinces, in the most decided manner, the symptoms, which result from the presence of foreign bodies in the trachea, and shews the only one surgical proceeding, which can be of use. But, among the phenomena, apparently difficult of explanation, is the calm, which, at different intervals, followed the afflicting cough. Anatomy, however, has dispelled much of the doubt on this matter. It is known, that the whole canal of the trachea is much less sensible, than the rima glottidis. A foreign body, like a bean, may remain a certain time in that canal without much inconvenience, the passage being only somewhat obstructed, according to the position of the substance. It may even remain several days, months, or years, without producing any symptom of its presence, except a trivial sensation of obstruction, and this is what happens, when the body lodges in one of the ventricles of the larynx. Facts of this kind are to be found in Tulpius, Bartholine, and many other observers. But, when the extraneous substance quits its situation, and is carried into the trachea, the irritation, which it produces there, and, particularly, about the larynx, occasions coughing, and if, in the fits, the foreign body should become fixed between the lips of the glottis, it may cause instantaneous death, as probably has happened in many of the cases of suffocation from extraneous substances.

Another remarkable circumstance which deserves more attention, as it confirms the presence of a foreign body in the trachea, is the emphysema, which appeared about the clavicle, towards the termination of the case. M. Louis did not believe, that any of the persons, who saw the patient, could entertain a just idea of the origin of this symptom. It might be imagined, that the obstruction, which the foreign body caused, for two days, to the free passage of the air, might have occasioned a forcible distention of the trachea, and a rupture of the membranes, which connect together the cartilaginous rings of this tube; but this error was dispelled by the examination after death. The windy tumour had not originated in the circumference of the trachea; here its limits were only seen. The very substance of the lungs, and the mediastinum, were emphysematous. The air, which was confined by the foreign body, must have ruptured the air-cells, during the violent fits of coughing, and thus insinuated itself into the interlobular cellular substance of the lungs. Thence the air must have passed into the cellular substance of the lungs. Thence it must have passed into the cellular substance connecting the pleura pulmonalis with the outer surface of these organs, and by the communication of the cells with each other, it produced a prodigious swelling of the cellular substance, separating the two layers of the mediastinum. The emphysema, in its progress, at length made its appearance above the clavicles. The swelling of the lungs, and the circumjacent parts, in consequence of the insinuation of air into the cellular substance, is a manifest cause of suffocation. The tumefaction appears to be so natural an effect of the presence of a foreign body in the trachea, that one can hardly believe it is not an essential symptom, though before M. Louis, no author made mention of it.

Foreign bodies in the trachea, however, do not always cause death so suddenly, which may be owing to their smallness, their smoothness, or the situation in which they are fixed. An example is related in *les Ephémérides des Curieux de la Nature, Decad.* 2. *Ann.* 10. As a monk was swallowing a cherry, precipitately, the stone of the fruit passed into the trachea. A violent cough, and excessive efforts, as it were, to vomit, were the first symptoms of the accident, and of these the patient thought he should have died. A sleep of some hours followed this terrible agitation, and the patient afterwards did not feel the least inconvenience during a whole year. At the end of this time, he was attacked by a cough, attended with fever. These symptoms became worse and worse, every day. At length the patient evacuated a stone as large as a nutmeg. It was externally composed of tartareous matter, to which the cherry-stone had served as a nucleus. A copious purulent expectoration followed the discharge of the foreign body, and the patient died consumptive some time afterwards. No mention is made of the body being opened; but, from the symptoms, there is every reason to believe, that an abscess must have arisen in the substance of the lungs, from the presence of the foreign body. That foreign bodies in the trachea, even when they do not induce pressing symptoms of suffocation, may ultimately kill the patient by inducing disease of the lungs, is proved by several cases on record, and, particularly by one, which occurred to Desault; a cherry-stone was lodged in one of the ventricles of the larynx; the patient would not consent to an operation, and died after two years *d'une phthisie laryngée.* (See *Œuvres Chir. de Desault, Tom.* 2, *p.* 258.)

Some valuable observations, confirming the necessity of an early recourse to bronchotomy, in cases, where foreign bodies are lodged in the trachea, have been published by M. Pelletan, now one of the surgeons of the Hôtel-Dieu, and a practi-

tioner of vast experience. In one case, in which a bean had fallen into a child's trachea, and in which the most urgent symptoms of suffocation had prevailed for four days, and convulsions during the last thirty-six hours of this space of time, M. Pelletan performed the operation, which a timid practitioner, under whose management the young patient was first placed, had neglected to do at an earlier period. Upon the incision being made into the trachea, the bean was immediately thrown out to the distance of two feet, and the child for a time was relieved. The little boy was so extremely weak, that it was at one time supposed he was dead. However, with the assistance rendered to him, he gradually revived, even regained his senses, called his parents, and asked for such things as he wanted.

This hopeful state lasted eight or ten hours, after which, convulsions came on again, and the child died fourteen hours after the operation.

Notwithstanding the turgid appearance of all the blood-vessels of the brain, as detected after death, the little boy had yet received a degree of relief at the instant of the foreign body being extracted. M. Pelletan deems it unnecessary to insist on the great probability of success, that would have attended the operation, had it been performed at an earlier period.

Of such success, M. Pelletan gives us the following example.

In the month of May, 1798, a child, about three years old, was brought to the Hôtel-Dieu, who, in playing with some French beans, and putting them into its mouth, let one of them slip into the trachea. For three days, the child was afflicted with a continual cough, and sometimes the symptoms of suffocation were most presssing. This time had been spent in administering emetics, introducing instruments into the œsophagus with the design of forcing the foreign body into the stomach, and in inspiring the relations with a pernicious confidence, arising from the very long intervals of repose, which the child experienced, during which, however, a rattling in the throat continued, a characteristic mark of the accident. Pelletan immediately decided to perform the operation. The child was very fat, and this circumstance, together with the small diameter of the trachea at this age, rendered the exposure of the anterior portion of this tube difficult. Pelletan was at this moment struck with the reflection, that bronchotomy should never be attempted except by men of science, coolness, and experience in operations. The rings of the trachea, however, were at length cut, and there was no sensible interval, between the incision and the expulsion of the foreign body. The bean had swelled considerably with the moisture. The child seemed restored to life; it spoke freely; it was only troubled with coughing, the effect of a small quantity of blood insinuating itself into the trachea, which fluid was instantly rejected again. This event has the appearance of convulsions, and may alarm those, who do not understand it; but, according to Pelletan, it is the guarantee of the patient's life by expelling, incessantly, and without difficulty, whatever happens to get into the trachea. The wound was healed in twenty days, and the child's voice was not perceptibly altered.

In another interesting case, recorded by the same writer, a pebble was lodged in the windpipe, and the case, not being understood, was treated, for about three weeks, as a simple inflammation of the lungs. At last, bronchotomy was performed, and, by placing the child in a horizontal position, the stone was soon discharged through the incision. The patient was immediately relieved; but, the effects of the inflammation of the lungs, and injury which these organs had sustained, could never be entirely cured, and the child died phthisical eight months afterwards.

M. Pelletan details other cases, in which the foreign body, being fixed in the trachea, could not be forced out by the breath, as soon as the incision was made, but, required further means to disengage it. In one instance, Pelletan made a long cut in the windpipe of a child; but, nothing made its appearance. A probe, wrapped round with some oiled linen, was then introduced several times up and down the larynx, without creating a great deal of uneasiness, and the child continued to respire very well through the opening in the trachea. The foreign substance was presently brought to the wound and extracted: it proved to be part of the jaw of a mackarel, with many sharp teeth in it. This child soon experienced a perfect recovery.

In another instance, a young man came to the Hôtel-Dieu, in consequence of being afflicted, for six weeks, with a severe cough, frequently accompanied with a sense of suffocation. These complaints, on enquiry, were ascertained to arise from a button mould having fallen into the trachea. An opening was, therefore, made in this tube; but, though the button could be felt, it could not be extracted with the finger. The cricoid cartilage was now divided, and the foreign body was then taken out of the left ventricle of the larynx. The man recovered.

In one case, related by Pelletan, a piece of tendon of veal, got down the glottis,

and gave rise to most dangerous symptoms. The foreign body was described as being so large, that this surgeon could not but suppose, that the complaints were owing to its lodgment in the œsophagus, as it seemed to be incapable of entering the glottis. The introduction of instruments down the pharynx, however, produced no relief; but, on dividing the thyroid cartilage, Pelletan passed his finger within the larynx, and, without knowing it, pushed the piece of tendon towards the glottis, when, with the aid of a probang, it was forced into the pharynx and swallowed. The patient experienced immediate relief, and got quite well. (See *Pelletan's Clinique Chirurgicale, Tom.* 1.)

With respect to bronchotomy, or cases, in which extraneous substances are supposed to be lodged in the trachea, one important caution seems necessary, viz. whenever the foreign body is above a certain size, a probang should always be passed down the œsophagus before cutting into the windpipe; for, very similar symptoms to those, which proceed from extraneous substances in the trachea, may be caused by the lodgment of foreign bodies in the œsophagus. In fact, bronchotomy has actually been performed, while the extraneous substance was in the œsophagus, from which last situation no attempt was made to displace it, and the patient lost his life. (See *Œuvres Chirurgicales de Desault, Tom.* 2, *p.* 261.)

Bronchotomy has been proposed in cases, in which the tongue is so enlarged, as totally to shut up the passage through the fauces. Richter mentions an inflammation of the tongue, in which this part became four times larger than in the natural state. Valescus had made the same observation: *Ego aliquando vidita magnificatan, linguam propter humores, ad ejus substantiam venientes, et ipsam imbibentes quod quasi totum os replebat, et aliquando ex ore exibat. Lib.* 2, *cap.* 66. Such prodigious swellings of the tongue are said sometimes to occur in malignant fevers, and the small-pox. They are also sometimes quite accidental, as, for instance, the cases which happen from the stings of insects, or the unskilful employment of mercury. Mr. B. Bell gives an example of the latter sort. He says, that the patient had taken, in a very short time, so large a quantity of mercury, that the part became alarmingly swollen in a few hours, and, though all the usual remedies were tried, none had the least effect. Bronchotomy was delayed till the patient was nearly suffocated; but he was restored as soon as an opening was made in the trachea. Some have objected to this practice, alleging, that scarifying the tongue will bring relief in time. (*Encyclopédie Méthodique; Partie Chirurgicale, Art. Bronchotomie.*) M. Malle's observations on the swelling of the tongue, and the most effectual means of relieving it, seem to confirm the latter sentiment.—(*Mém. de l'Acad. de Chirurgie, Tom.* 14, *p.* 408, &c. *Edit. in* 12*mo.*)

In cases of the preceding description, Desault would have advised the introduction of an elastic gum catheter, from the nose into the trachea, in order to enable the patient to breathe, until the swelling of the tongue had subsided. (See *Œuvres Chirurgicales de Desault par Bichat, Tom.* 2, *p.* 246.)

Bronchotomy has been proposed, when both the tonsils are so enlarged that they quite impede respiration. Here, the inflammatory swelling is not meant; this commonly soon suppurates, and the spontaneous bursting of the tumour, or the opening of it with a pharyngotomus, always does away the necessity for so extreme a measure. It is the chronic enlargement now alluded to, that case mentioned in the article *Tonsils*, and which sometimes acquires an immense size. From our remarks on the disease, it will be seen, that more is to be expected from the excision of the tonsils, than from the operation now in question. Besides, before the glands are so large as to threaten suffocation, they should be cut away, in preference to performing bronchotomy, which would relieve the urgency, but not the cause. In general, there is here only a fear of suffocation, when the swelling is such as not only to shut up the posterior aperture of the mouth, but also the posterior openings of the nostrils, which is exceedingly rare. In cases of obstructed respiration from enlargement of the tonsils, Desault preferred the introduction of the elastic catheter, from the nose into the larynx, to the operation of bronchotomy. It is not common for a polypus to make this operation necessary. Boerhaave, however, mentions a case, in which the patient was suffocated, as the surgeon was going to extirpate a tumour of this kind: no doubt, this patient might have been saved, if bronchotomy had been previously performed. Polypi, growing in the larynx itself, are very rare; but, examples are recorded; and, if such tumours happen to obstruct the glottis, the patients are instantly suffocated. Some instances of this kind are related by Bichat. The only mode of getting at such swellings so as to extirpate them, is by performing bronchotomy. (See *Œuvres Chirurg. de Desault par Bichat, Tom.* 2, *p.* 254, 255.)

Lastly, bronchotomy has been recommended to be done on persons recently suffocated or drowned. Detharding is the first author, who has treated of the necessity of this operation, in the latter case, in a letter addressed to Schroeck,

intitled, *De Methodo subveniendi submersis per laryngotomiam. Hactenus rectè*, says Haller, *si spuma quâ pulmo in submersis offercitur eâ administratione repelli quiret.* This writer maintains, that drowned persons have no water in their chests, or air-vessels of the lungs, and that they perish suffocated, for want of air and respiration, and that, while the person is under water, the epiglottis applies itself so closely over the glottis, that not one drop of water can pass. But, these assertions are quite contrary to the numerous experiments made by M. Louis, who drowned animals in coloured fluids, and proved that they who are drowned, inspire water, with which the air-vessels and cells are quite filled. M. Louis has also opened men, who have perished under water, but, in them, he never found the epiglottis applied to the glottis, as Detharding says it is; indeed, anatomy proves the impossibility of its being so. Detharding's theories were wrong, and, as he did not use any power to distend the lungs with air, his mere practice of bronchotomy must have been useless. When there is a free communication between the cells of the lungs and the atmosphere, the air will not expand these organs, if the inspiratory muscles can no longer act. Hence, after opening the trachea, and letting as much water run out of this tube as possible, the pipe of a pair of bellows should be introduced, and the air forcibly introduced into the lungs.

Detharding's opinion, that drowning is a species of suffocation, was right, and that the privation of oxygen gas is the cause of death. Hence, we see the propriety of introducing this air into the lungs, as speedily as possible, whenever we think, that animation has not been so long suspended, that every hope of restoration is over. Indeed, it is proper to distend the lungs with air, in all cases in which animation has been recently suspended by suffocation, immersion under water, or by noxious vapours and gases. This measure is highly proper, in conjunction with electricity, the communication of warmth to the body, the application of strong volatiles to the nostrils, rubbing the body with warm flannels, and the injection of any fluid, like warm wine and water, into the stomach, through a hollow bougie. Tobacco clysters, which even have had the sanction of the Royal Humane Society, should, however, be reprobated, as the qualities of this plant are peculiarly destructive of the vital principle, and not simply stimulating. I am sorry to find this last means commended by so respectable a surgeon as M. Larrey, who joins the rest of the French surgeons in condemning electricity and bronchotomy. He speaks in favour of opening the jugular vein, exposing the body to the fire, friction, &c. On dissecting the bodies of some drowned persons, M. Larrey found, as M. Louis had done long since, that the air-tubes of the lungs were filled with water, instead of air, and that the epiglottis was raised and applied to the os hyoides. (See *Mémoires de Chirurgie Militaire, Tom.* 1, *p.* 83—85.)

There are many modern practitioners, who consider bronchotomy, as needless in cases of suspended animation, because, it is contended, that, as the patient is always destitute of sensation, a tube may easily be passed into the trachea from the nose or mouth, for the purpose of inflating the lungs. Either the curved pipe of a pair of bellows may be introduced into the glottis through the mouth, or an elastic gum catheter may be passed into the trachea from the nose. "*On peut mettre ce moyen à exécution* (*says Pelletan*) *chez les asphixiés, ou les enfans nouveaux nes, qui ne respirent pas; parsque, dans ces differens cas, non seulement il n'y a pas d'inflammation, mais même toute sensibilite est suspendue, et la canule est commode pour souffler de l'air dans les poumons, en méme temps qu'elle peut causer une irritation salutaire. M. Baudelocque, mon célèbre confrère m'a temoigné se servir habituellement, et avec succès de ce moyen pour appeler à la vie les nouveaux nés dont la respiration ne s'établit pas.* (*Clinique Chirurgicale, Tom.* 1. *p.* 29.)

Desault likewise conceived, that the lungs might be easily inflated, without performing bronchotomy. (*Œuvres Chir. Tom.* 2, *p.* 239.)

Mr. A. Burns adopts the same sentiment. (*Surgical Anatomy of the Head and Neck, p.* 384.)

My own individual opinion upon this subject is, that, if a surgeon knows, that he can inflate the lungs as completely and expeditiously, without performing bronchotomy, as he could by making an incision in the trachea, he is right in dispensing with the latter operation. But, in the generality of cases of suspended animation, (that of new-born infants excepted) where bronchotomy would be an objectionable undertaking, I much doubt, whether in actual practice bronchotomy will not be found the best and most speedy means of enabling the surgeon to distend the lungs with air. If you follow Desault's suggestion, I contend, that you are likely to be some minutes longer in getting the elastic catheter from the right nostril into the larynx, than you would be in cutting into the trachea, and introducing into the incision the muzzle of a pair of bellows. Supposing the elastic catheter introduced, will you now be able to distend the lungs with air, in an ade-

quate degree, an object of the highest moment? A pair of bellows seems to me almost essential to this purpose. I shall say nothing on the probability of many practitioners coming to the patient unprovided with the requisite sort of tube.

If a pair of bellows, with a curved pipe, be employed, many surgeons would be a considerable time in getting the muzzle into the glottis, and, in the mean while every spark of life might be extinguished. On the other hand, bronchotomy (performed by a man of ordinary care and skill) is an operation free from danger. It may be executed with a penknife, if no better instrument be at hand; and, when the incision has been made, a pair of common bellows will suffice for the inflation of the lungs. Did I conceive, that bronchotomy were a perilous operation; that the lungs could be effectually distended without the employment of bellows; that the object could generally be accomplished as expeditiously without cutting into the trachea; I should be as ready to join in the condemnation of this last proceeding, as any cotemporary writer. Greatly, however, as I respect most of the authors, who differ from me on this point, the reasons I have assigned, prevents me from subscribing to their sentiment. Desault, who may be regarded as the founder of the doctrine, concerning the inutility of bronchotomy, it is also to be observed, spoke only from theory, and not actual practice, in these cases.

DESCRIPTION OF THE OPERATION.

No preparation is necessary, as delay only increases the danger. The patient being seated in an arm-chair, or, what is better, laid on a bed with his head hanging backward, an incision is to be made, which is to begin below the cricoid cartilage, and to be continued downward, about two inches, along the space between the sterno-thyroidei muscles. Care should be taken not to cut the lobes of the thyroid gland, lest a troublesome and dangerous bleeding should be occasioned, and, as the left subclavian vein lies a little below the upper part of the first bone of the sternum, the incision should on no account ever extend in the least below the top of this bone. The knife must not be carried either to the right or left, in order to avoid all risk of injuring the large blood vessels situated at the sides of the trachea. The incision in the integuments being made, the sterno-thyroidei muscles are to be pushed a little towards the side of the neck, so as to bring the trachea fairly into view. Most authors recommend the point of the knife to be then introduced between the third and fourth cartilage of the trachea, and the opening to be enlarged transversely. It is true, that, in this way, an opening may be safely made, large enough to allow of the introduction of a small cannula. It is safer, however, in all cases, to enlarge the opening in the perpendicular direction, by cutting from within outward. There is no advantage in avoiding a wound of the cartilages of the trachea, and this was the only reason for cutting the membrane between two of them, in a transverse direction; while a sufficiently large opening could not thus be safely obtained in cases in which it is necessary to introduce the muzzle of a pair of bellows, in order to inflate the lungs. In short, it is safer and better, in every instance, to make the wound in the trachea in a perpendicular manner.

I have stated, that bronchotomy may be performed by a man of ordinary skill, without hazard. It is far otherwise with a careless practitioner. We read in Desault's work, that, in one instance, the carotid artery was wounded. The following cautions, given by Mr. A. Burns, seem entitled to notice. "The arteria innominata is in risk in some subjects. I have seen it mounting so high on the forepart of the trachea, as to reach the lower border of the thyroid gland. Even the right carotid artery is not always safe. I am in possession of a cast, taken from a boy of twelve years of age, which shews the right carotid artery crossing the trachea in an oblique direction. In this subject, that vessel did not reach the lateral part of the trachea till it had ascended two inches and a quarter above the top of the sternum.

"Where both carotid arteries originate from the arteria innominata, there is considerable danger in performing the operation of tracheotomy, for, in such cases, the left carotid crosses the trachea pretty high in the neck. Professor Scarpa has seen a specimen of this distribution in a male subject, and I have met with five.

"These varieties in the course of the arteries are worthy of being known, and remembered; they will teach the operator to be on his guard, since he can never, *a priori*, ascertain the arrangement of the vessels with any degree of certainty. It will impress on his mind the impropriety of using the knife further, than merely to divide the integuments and fasciæ. If he then clear the trachea with the fingers, he will never injure any of the large arteries. When, with the finger, he has fairly brought the trachea into view, he ought to examine carefully, whether any of the large arteries lie in front of it, and if he find one, he ought to depress it toward the chest, before he penetrates into the windpipe.

"In cutting into the trachea, the preferable plan is to cut the rings from below upward, avoiding injury of the thyroid gland." (See *A. Burns on the Surgical Anatomy of the Head and Neck*, p. 393—394.)

When bronchotomy is performed for the purpose of inflating the lungs, the cut in the windpipe must be made somewhat larger than when only an opening is required to enable the patient to breathe through a small cannula. The larger size of the pipe of the bellows, is the reason of this circumstance.

When a cannula is to be introduced, care must be taken not to pass it too far into the wound, lest it should injure the opposite side of the trachea. This is a caution, on which Fabricius ab Aquapendente dwells very strongly, and with good reason.

Small as the vessels may be, which are divided in bronchotomy, they occasionally bleed so much, as to create apprehension, and even prevent the process of the operation. There is a case in Van Swieten's Commentaries, confirming this remark. A Spanish soldier, aged twenty-three, was in the most urgent danger from an inflammation of his throat. It was thought nothing could save him, except bronchotomy. After the longitudinal cut in the skin, and the separation of the muscles, the trachea was opened between two of the cartilages; but the blood insinuated itself into this canal, and excited so violent a cough, that the cannula could not be kept in by any means, though it was replaced several times. M. Louis remarks, that, in this instance, the patient's head should have been turned downward, in order to keep the blood from flowing backward into the trachea. It is asserted, that the opening of this tube was not always opposite the external wound, in consequence of the convulsive action of the muscles, and that the patient on this account could hardly breathe. Hence M. Vigili was induced to slit open the trachea, down to the sixth cartilaginous ring; and it was only then that he inclined the patient's head forward. The bleeding now ceased, the patient breathed with ease, and, on the second day, the inflammation was so much better, that respiration could go on without the aid of the opening in the trachea.

To obviate the preceding accident, a proposal has been made to adapt a cutting blade to a cannula, of a suitable size, adapted for remaining in the wound, and sufficiently compressing the orifices of such vessels as might be opened. In Richter's *Observationes Chirurgicæ*, a description of some instruments of this kind may be seen. Mr. B. Bell has described one, somewhat like a flattened trocar, only not quite so long. The patient's head being inclined backward, as far as possible, the point of the instrument is to be introduced between two of the cartilages: between the lower margin of the thyroid, and the upper edge of the cricoid, is said to be the best situation, being more extensive, less vascular, and, after the division of the skin, there being only the crico-thyroid ligament to be divided. When the instrument has entered, the lancet is to be withdrawn, and the cannula fixed, by means of a ribbon, which is tied to each of the wings of the instrument, and must be fastened at the back of the patient's neck. Should the instrument be too long, it should be passed through two or three little compresses, before being put into the windpipe, which artifice will make it answer as well as a shorter one. A piece of gauze is then to be tied once on the outward orifice of the cannula.

Sometimes, though very seldom, the cannula becomes obstructed with mucus or clots of blood. Such an accident nearly suffocated a patient at Edinburgh. A man of genius, who was at hand, suggested the introduction of a second cannula into the first; the second one being taken out, and cleaned, as often as necessary, and then replaced. Monro, the father, used to recommend this plan. It is better, however, to have at once a double cannula, to fit the stilette.

The use of the cannula must be continued as long as the causes, obstructing respiration, remain.

When respiration is suspended by the presence of a foreign body in the trachea, and the extraneous substance does not make its appearance at the opening made, a trial may be made to discover its situation by means of a bent probe. When it lies downward, which it hardly ever does, the wound in the trachea may be enlarged in this direction, and the body may be extracted with a pair of curved forceps. The extraneous substance is mostly forced out by the air, as soon as the incision in the trachea is opened. When it cannot be immediately found, some practitioners (Heister and Raw) have succeeded by keeping the lips of the wound asunder with pieces of sheet-lead, by which means, the force of the air in expiration has, in a few hours, expelled the foreign body.

Richter thinks he has perfected bronchotomy, by using a curved cannula; but the inconveniences, which he attaches to the straight one, hardly ever occur. A curved cannula cannot be so conveniently introduced into another one similarly shaped.

On the continent, the operation of laryngotomy, which was first advised, by

Vicq. d'Azyr, and is recommended by Desault, is mostly preferred to tracheotomy. The surgeon makes an incision over the anterior part of the thyroid cartilage, punctures the crico-thyroid membrane, and, if it be necessary, introduces a director, and slits the thyroid cartilage upwards. A mere opening in the crico-thyroid membrane would suffice for the introduction of a cannula for the purpose of enabling the patient to breathe; in most other instances, it would be necessary also to cut the thyroid cartilage. The fact, that extraneous substances, when they are loose, are almost always lodged at the upper part of the larynx, indicates, that bronchotomy in such cases must generally be most advantageous; and, according to Desault, even when the foreign bodies are lower down in the trachea, they may ordinarily be most easily extracted with the aid of a pair of curved forceps. In this country, laryngotomy has had few advocates, though it was, a few years since, commended by Mr. Coleman.

The reader may collect the most valuable information on the foregoing subject from the following sources: *Hevin sur les corps Etrangers qui sont arrêtes dans les premieres Voies, et qu'il faut tirer par incision, in Mém. de l'Acad. Royale de Chirurgie, Tom.* 3, *p.* 131, &c. *edit.* 12*mo. Louis, Mémoire sur une question Anatomique relative a la jurisprudence, où l'on établit les principes pour distinguer, à l'inspection d'un corps trouvé pendu, les signes du suicide d'avec ceux de l'assassinat. Van Swieten's Commentaries. Habicot, Question Chirurgicale, par laquelle il est démontré que le Chirurgien doit assurément pratiquer l'opération de la Bronchotomie, &c. published,* 1620. *Mémoire sur la Bronchotomie par M. Louis, in Mém. de l'Acad. de Chirurgie, Tom.* 12, *Edit.* 12*mo. Second Memoir on this subject, inserted by the same writer in the said volume. De la rescission des Amygdales, Tom.* 14, *p.* 283, &c. *Précis d'Observations sur le Gonflement de la Langue, &c. par M. de la Malle, Tom.* 14, *p.* 408. *Lescure, sur un portion d'Amande de noyau d'Abricot, dans la Trachée Artere, Tom.* 14, *p.* 427. *Suite d'Observations sur les Corps Etrangers dans la Trachée Artere, Tom.* 14. *p.* 432. *Expériences sur ces las par M. Favier, Tom.* 14, *p.* 445. *Bertrandi, Traité des Opérations de Chirurgie, p.* 402, &c. *Edit.* 1784. *Sabatier, de la Médecine Operatoire, Tom.* 2, *p.* 283, *Edit.* 1. *Œuvres Chirurgicales de Desault par Bichat, Tom.* 2, *p.* 236, &c. *Pelletan, Clinique Chirurgicale, Tom.* 1, *First Memoir. Cheyne, Pathology of the Larynx and Bronchia. A Burns, Surgical Anatomy of the Head and Neck, p.* 377, *to* 401. *Richter's Anfangsgrunde der Wundarzneykunst, Band* 4, *p.* 225, &c. *Gottingen,* 1800.

BUBO. (βουβων, the groin.) Modern surgeons mean, by this term, a swelling of the lymphatic glands, particularly of those in the groin, and axilla.

The disease may arise from the mere irritation of some local disorder; from the absorption of some irritating matter, such as the venereal poison; or from constitutional causes.

Of the first kind of bubo, that, which is named the *sympathetic*, is an instance. Of the second, the venereal bubo is a remarkable specimen. (See *Venereal Disease.*)

The *pestilential bubo*, which is a symptom of the plague, and the *scrofulous* swellings of the inguinal and axillary glands; may be regarded, as examples of buboes from constitutional causes. (See *Scrofula.*)

SYMPATHETIC BUBOES.

The inguinal glands often become affected with simple phlegmonous inflammation, in consequence of irritation in parts, from which the absorbent vessels, passing to such glands, proceed. These swellings ought to be carefully discriminated from others, which arise from the absorption of venereal matter. The first cases are simple inflammations, and only demand the application of leeches, the cold saturnine lotion, and the exhibition of a few saline purges; but the latter diseases render the administration of mercury indispensable.

Sympathetic is the epithet usually given to inflammation of glands from mere irritation; and, we shall adopt it, without entering into the question of its propriety.

The sympathetic bubo is mostly occasioned by the irritation of a virulent gonorrhœa. The pain, which such a swelling gives, is very trifling, compared with that of a true venereal bubo, arising from the absorption of matter, and it seldom suppurates. However, it has been contended, that the glands in the groin do sometimes swell and inflame from the actual absorption of venereal matter from the urethra, in cases of gonorrhœa, and which swellings must consequently be venereal. (*Hunter on the Venereal, p.* 57.)

The manner, in which buboes form from mere irritation, will be better understood by referring to the occasional ill consequences of venesection, in the article *Bleeding.* The distinguishing characters of the venereal bubo are noticed in the article *Venereal Disease.*

PESTILENTIAL BUBO.

A pestilential bubo, at its commencement, is a small, hard, round tumour, readily perceptible to the touch, about

the size and shape of a pea; it is moveable under the skin, the appearance of which is not altered at an early period, the bubo lying more or less deeply, and the swelling not appearing externally. As the tumefied gland enlarges, it changes from a round to an oval shape, becoming, at the same time, less moveable. The integuments now begin to thicken, and the swelling to appear externally. The appearance of the bubo is often preceded by a sense of tightness and pain, sometimes of a lancinating kind, or by an itching in the part, where it is about to appear, and, now and then, the disease is preceded by shivering. In many cases, however, the small swelling, just described, comes on, without being preceded by any peculiar symptoms.

Some buboes are indolent, and insensible, others very sensible and rapid in their progress. When the tumour advances quickly to suppuration, the circumstance is generally regarded as favourable. Cases, however, in which the matter soon forms, are frequently fatal, and there are many histories of other cases, which terminated favourably, though the buboes were extremely indolent, and ended in resolution.

It is difficult to foresee in what way a bubo will terminate. The fluctuation is often scarcely perceptible, where suppuration has taken place, and buboes are sometimes resolved, after there has been a very evident fluctuation. Their progress, indeed, is almost always, more or less, irregular, especially, after the first week. At one time, they seem advancing to suppuration; at another time, they shew a tendency to resolution. But, these variations, Dr. Russell remarks, chiefly respected the integuments; for, the gland itself, when carefully explored, was seldom found to alter; and, when the tumour actually dispersed, it was not suddenly, but, by slow degrees. Thus, from the alteration in the integuments alone, the whole tumour, on a superficial view, seemed to lessen or increase, though the gland remained the same; and Dr. Russell was inclined to think, that this deception was often the cause of the bubo being said to fluctuate, or to vanish in appearance, and again return. However, he is far from thinking, that this fluctuation was never real. Chenot observes: *Vidimus quoque abruptam suppurationem in his resuscitari, ac demum per effusionem puris absolvi.*

The bubo, as it increases in size, becomes somewhat flat; and, generally about the second week, the skin over it grows tense, and painful, and begins to be inflamed. In some cases, the inflammation is moderate; in others, considerable; but, it seldom terminates in gangrene, although the skin, now and then, assumes a bluish colour.

Sometimes, however, the bubo suppurates without the skin seeming to be at all inflamed; and, in this circumstance, as the tumour is generally harder, than a suppurated venereal bubo, it is often difficult to determine, whether suppuration has taken place, or not. When buboes break spontaneously, it generally happens in the third week; sometimes at a later period.

The buboes most frequently appear in the groin, or a little lower, among the lowest cluster of inguinal glands. They also frequently appear among the axillary glands: sometimes, though more rarely, they have their seat in the parotid, and the disease is then by many reckoned more dangerous, than when the buboes appear in the groins, or armpits. Still more rarely, they appear in the maxillary, or cervical glands. These latter, Dr. Russell remarks, were seldom observed to swell, without either the parotid swelling at the same time, or soon afterwards, or a carbuncle protruding near them. They never were the sole pestilential eruptions; and he recollects few instances of their coming to maturation. It has been remarked by others, that the parotid bubo seldom appears unaccompanied by one, or more, in the axilla, or groin.

Axillary buboes, generally speaking, suppurate more frequently than those about the fauces, and the inguinal more frequently than the axillary.

Buboes often make their appearance on the first day of the complaint; sometimes, indeed, they are among the first symptoms. It has been observed, that when they appear later, than the third, or fourth day, they are generally preceded by an exacerbation of the febrile symptom. Those, which come out at so late a period, however, are not, for the most part, the first, which appear in the course of the complaint; for, a succession of buboes sometimes takes place, till three or four have made their appearance.

Sometimes, no buboes appear, and these cases are, upon the whole, the most fatal. This is a circumstance, which particularly demands attention, as the cases, unattended with buboes, and other pestilential eruptions, generally make their appearance at the commencement of the epidemic, and have often, in consequence of the absence of the eruptions, been mistaken for other complaints. In other cases, particularly, towards the decline of the epidemic, the buboes, and other eruptions, often form the principal part of the complaint, which is then unattended with danger; from which it would appear, that the eruptions in the plague

are to be regarded as favourable symptoms.

When the inflamed gland advances to suppuration more rapidly than the integuments; troublesome fistulous ulcers are sometimes formed, if an artificial opening has not been made in the skin. This accident, however, is rare: in general, the buboes, when left to themselves, do not prove troublesome.

When they do not suppurate, and the patient recovers, they gradually disperse, generally in the space of a few weeks. In some cases, they are succeeded by an induration of the gland, which remains for many months. Even when suppuration has taken place, if the cure proves tedious, either in consequence of the matter having been discharged by too small an opening, or the opening having repeatedly closed in the progress of the cure, a similar induration sometimes succeeds; which, in like manner, sooner or later disappears.

In the plague, buboes, termed spurious, sometimes form. Spurious buboes differ from the true ones, in appearing indiscriminately on every part of the body; while the latter are confined to the groin, axilla, and parts about the fauces. Spurious ones were observed, says Dr. Russel, on the head, the forehead, the throat, the shoulder, above the clavicle, the neck, on, or above, the scapulæ, the back, the side, under the breast, on the belly, the hip, hind-part of the thigh, near the ham, the leg, the scrotum, the arm near the usual place of issues, inside of the arm near the elbow, outside of the forearm, and near the wrist.

Some of these buboes, if not lanced at a proper time, grow to a great size; particularly, those on the scapulæ, or back. In other parts, however, they seldom much exceed the size of a hen's egg. They generally appear about the second, or third day, after true buboes, or carbuncles; and usually suppurate, though not so quickly, as true pestilential buboes do. (See *Wilson on Febrile Diseases.*)

BUBONOCELE. (from βουβων, the groin, and κηλη, a tumour.) A species of hernia, in which the bowels protrude at the abdominal ring. The case is often called an *inguinal hernia*, because the tumour takes place in the groin. Every thing, necessary to be known on this subject, will be found in the article *Hernia*.

BUPHTHALMUS. A morbid enlargement of the eye.

BURNS. A burn is an injury, more or less superficial, occasioned by the contact of some substance, heated beyond what the body can bear, without its fibres and organization being hurt.

Burns present different appearances, according to the degree of violence, with which the causes producing them have operated, and according to the kind of cause, of which they are the effect. Burns, which only irritate the surface of the skin, are essentially different from those, which destroy it; and these latter have a very different aspect from what others present, which have attacked parts more deeply situated, such as the muscles, tendons, ligaments, &c. Scalds, which are the effect of heated fluids, do not exactly resemble burns, occasioned by the direct contact of very hot metallic bodies, or some combustible substance on fire. As fluids are not capable of acquiring so high a temperature, as many solid things, scalds are generally less violent than burns, in the injury which they produce; but, in consequence of liquids often flowing about with great rapidity, and being suddenly thrown in large quantities over the patient, scalds are frequently dangerous on account of their extent. It is well worthy of remark, that the danger of the effects of fire is more proportioned to the size than the degree, of the injury. A burn, that is so violent, as to kill parts at once, may not be in the least dangerous, if not extensive; while, a scald, which perhaps only raises the cuticle, may prove fatal, if very large. The degree of danger, however, is to be rated from a consideration both of the size and violence of the injury. The worst burns, which occur in practice, arise from explosions of gunpowder, or inflammable gases, from ladies' dresses catching fire, and from the boiling over of hot fluids, in laboratories, manufactories, &c.

Burns, which only destroy the cuticle, and irritate the skin, are very similar to the effects, produced by cantharides and rubefacients. The irritation, which such injuries excite, increases the action of the arteries of the part affected, and they effuse a fluid under the cuticle, which becomes elevated, and detached. Hence, the skin becomes covered with vesicles, or bladders, which are more or less numerous, and large, according to the manner, in which the cause has operated. But, when the skin, or subjacent parts, are destroyed, no vesicles make their appearance. In this circumstance, a black eschar is seen; and when the dead parts are detached, there remains a sore, more, or less deep, according to the depth, to which the destructive effects of the fire have extended.

The parts may either be killed, at the moment of the injury, by the immediate effect of the fire, or they may first inflame, and then mortify.

In all cases of burns, the quantity of injury depends on the degree of heat in

the burning substance; on the duration, and extent of its application; and on the sensibility of the burnt part.

When a large surface is burnt, mortification sometimes makes its appearance with great violence, and very quickly after the accident; but, in general, the symptom, the most to be dreaded, in such cases, is inflammation. The pain and irritation often run to such a pitch, that, notwithstanding every means, there is frequently immense trouble in keeping down the inflammation. When the burnt surface is very large, the effects of the inflammation are not confined to the part, which was first injured; but, even cause a great deal of fever; and, in certain cases, a comatose state, which may end in death.

It has been observed, that persons, who die of severe burns, seem to experience a remarkable difficulty of breathing, and oppression of the lungs. These organs, and the skin, are certainly both concerned in separating a large quantity of water from the circulation, and their participating in this function, may perhaps, afford a reason, for the lungs seeming to be affected, when a large surface of skin is injured in cases of burns. However, the kidneys perform the same office, and they are not particularly affected in burnt patients; so that the asthmatic symptoms, in these cases, are probably owing to a sympathy between the lungs and skin, or rather to causes not at present understood.

TREATMENT OF BURNS.

The former plan of treating burns was founded on principles, which seem applicable to cases of inflammation in general. The treatment was most commonly antiphlogistic, and even copious bleeding from the arm was not unfrequently practised.

We shall first offer a concise account of the old practice, as explained by Mr. B. Bell. When the skin is not destroyed, but seems to suffer merely from irritation, relief may be obtained by dipping the part affected in very cold water, and keeping it for some time immersed. This author states, that plunging the injured part suddenly into boiling water would also procure ease; an assertion, however, much to be doubted, and a practice not likely to be imitated. In some cases, emollients afford immediate relief; but, in general, astringent applications are best. Strong brandy, or alcohol, is particularly praised. At first the pain is increased by this remedy; but an agreeable soothing sensation soon follows. The parts should be immersed in the spirit, and, when this cannot be done, soft old linen, soaked in the application, should be kept constantly on the burn. Goulard's lotion, or a strong solution of the cerussa acetata, is recommended, and, said to prove useful, however, only by being astringent, as equal benefit may be derived from a strong solution of alum, &c. Such applications were frequently made with a view of preventing the formation of vesicles; but, Mr. B. Bell always remarked, there was less pain, when the blisters had already appeared, than when prevented from rising, by remedies applied immediately after the occurrence of the injury.

The applications should be continued, as long as the pain continues; and in extensive burns, creating great irritation, opium should be prescribed. The stupor, with which patients, so situated, are often attacked, receives more relief from opium, than any thing else.

Some recommend opening the vesications immediately; others assert, that they should not be meddled with. Mr. B. Bell thinks, they should not be opened till the pain arising from the burn, is entirely gone. At this period, he says, they should always be punctured; for, when the serum is allowed to rest long upon the skin beneath, it has a bad effect, and even induces some degree of ulceration. Small punctures, not large incisions, should be made. All the fluid having been discharged, a liniment of wax and oil, with a small proportion of saccharum saturni, is to be applied.

When there is much irritation and fever, blood-letting, and such remedies, as the particular symptoms demand, must be advised. When the skin ulcerates, the treatment does not differ from what will be described, when we speak of *Ulcers*.

When the burnt part, is, from the first, more or less destroyed, cooling emollient applications were formerly thought most effectual, and a liniment, composed of equal proportions of lime-water and linseed oil, gained the greatest celebrity. Even, at this day, the application is very often employed. Mr. B. Bell advises it to be put on the parts, by means of a soft pencil, as the application and removal of the softest covering, are often productive of much pain.

In come cases, Mr. B. Bell says, Goulard's cerate, and a weak solution of the saccharum saturni, procure ease more quickly, than the above liniment.

The sloughs having come away, the sores are to be dressed according to common principles. (See *Ulcers*.)

When burns are produced by gunpowder, some of the grains are apt to be forced into the skin. These should be picked out with the point of a needle, and an emollient poultice applied, which will dissolve and bring away any particles of gunpowder, which may yet remain.

Burnt parts, which are contiguous, are apt to grow together in the progress of the cure. The fingers, toes, sides of the nostrils, and the eye-lids are very liable to this occurrence. It is to be prevented by keeping dressings always between the parts, likely to become adherent, until they are perfectly healed.

The sores, resulting from burns, are, perhaps, more disposed, than any other ulcers, to form large granulations, which rise considerably above the level of the surrounding skin. No poultices should now be used. The sores should be dressed with any moderately stimulating, astringent ointment: the basilicum with the pulv. hydrarg. nitrat. rub. is now generally preferred: and, if the part will allow of the application of a roller, the pressure of this will be of immense service in keeping down the granulations, and rendering them more healthy. When these methods fail, the sores should be gently rubbed with the argentum nitratum.

MR. CLEGHORN'S PLAN.

Mr. Cleghorn recommends the immediate application of vinegar, which is to be continued for some hours, by any the most convenient means, until the pain abates. Should it return, the vinegar is to be repeated. If the pain is so severe as to have destroyed any part, when the pain has ceased, it is to be covered with a poultice, which must remain on six, or, at most, eight hours. When this is removed, the part is to be entirely covered with very finely powdered chalk, so as to make every appearance of moisture on the surface of the sore, no longer visible. This being done, the whole is to be covered with the poultice again. The same mode is then to be pursued every night and morning, until the cure is complete. If the use of poultices should seem to relax the ulcers too much, a plaster, or ointment, containing white lead is to be applied; but, the chalk is still to be used next the sore.

In respect to general remedies, Mr. Cleghorn allowed his patients to eat boiled, or roasted fowl, or, in short, any plain-dressed meat, they liked. He did not object to their taking moderate quantities of wine, spirits and water, ale, or porter. His applications he observed, allayed pain and inflammation, and either prevented, or removed fever, and, judging from their effects, he thought they had powerful antiseptic virtues. He never had occasion to order bark, or any internal medecines whatever, and he only once thought it necessary to let blood. When a patient was costive, Mr. Cleghorn used to order boiled pot-barley and prunes, or some other laxative nourishing food, and sometimes an injection, *but never any purgatives*. It is distressing to a patient with bad sores, to be often going to stool. Besides, Mr. Cleghorn remarked, that weakness and languor, (which never, in his opinion, hasten the cure of any sore) are always brought on, more or less, by purgatives. From the effects, too, which he felt them have upon himself, and observed them to have upon others, they did not seem to him to have so much tendency to remove heat and feverish symptoms as is generally supposed, and more frequently carry off *useful* humours, than *hurtful* ones.

Diluted sulphuric acid would not answer well, instead of vinegar. The latter produced most benefit, when it was fresh and lively to the taste.

In cold weather, in particular, Mr. Cleghorn used to warm the vinegar a little, place the patients near the fire, give them something warm internally, and, keep them, in every respect, in a comfortable situation. His object, in so doing, was to prevent the occurrence of tremblings, and chilness, which, in two instances, alarmed him a good deal, after employing vinegar, which was too cold.

The account of Mr. Cleghorn's plan was published by Mr. Hunter, in the *Med. Facts and Observations, Vol. 2.*

SIR JAMES EARLE'S PLAN.

This gentleman exclusively advises the use of cold water, or rather ice; and he has brought forward several cases of extensive burns, in which this method was employed with the best effect. We have mentioned cold water, among the applications to burns, enumerated by Mr. B. Bell, and it was certainly not uncommonly used long before Sir James Earle published on the subject. This author, however, has made the plan more extensively known, and, as it is an eligible one, he has a certain claim to praise. The burnt parts may either be plunged in cold water, or they may be covered with linen dipped in the same, and renewed as often as it acquires warmth from the part. The application should be continued as long as the heat and pain remain, which they will often do, for a great many hours. (See *Essay on the Means of lessening the Effects of Fire on the Human Body*. 1799.)

M. LARREY'S PLAN.

It seems to me, that, on the subject of burns, there is, even at the present day, as much contrariety of sentiment, as in any part of surgery whatsoever. After all the praises, which we have of late years heard of vinegar, cold applications, oil of turpentine, &c. a French surgeon, whose ta-

lents, and opportunities of observation, entitle his opinion to the highest attention, has recently censured the employment of all such remedies. M. Larrey, though a military surgeon, has had occasion to see numerous burns, in consequence of explosions. He declares, that he has been long struck with the bad effects of repellents, such as fresh water with the muriate of ammonia, oxycrate, the aqua vegeto-mineralis, and the solution of opium in ice-water, applications, which are extolled in some modern books, and used in cases of deep burns, by a great number of practitioners; and he expresses his belief, that such injuries frequently prove mortal, for want of more judicious treatment. He recommends dressing all deep burns, with fine old linen, spread with saffron ointment, which, he says, has the quality of diminishing the pain, and preventing irritation by keeping the nervous papillæ from coming into contact with the air, or being pressed by the linen and clothes. The employment of this ointment, (or, in case good oil cannot be procured for its composition, honey, instead of it) is to be continued till suppuration takes place. When this is established, M. Larrey applies the ointment of styrax, for the purpose of supporting the systaltic power of the subjacent vessels, promoting the detachment of the eschars, and checking the extension of the sloughing. As soon as the dead parts have separated, Mr. Larrey again has recourse to the saffron ointment, for which he gradually substitutes dry lint, with strips of linen spread with cerate. When the vessels exceed the level of the edge of the sore, he touches them with the argentum nitratum, and he occasionally applies a weak solution of the muriate of mercury, or of the sulphate of copper.

M. Larrey prescribes emollient and antispasmodic beverages, which are to be taken warm, such as milk of almonds, containing nitre, and properly sweetened; hydromel; rice ptisan, &c. His patients were never deprived of light nourishment, such as broths, jellies, eggs, soups, &c. His experience had taught him, that soldiers (who it is to be observed were his patients) cannot bear low diet, so well as persons leading an inactive life. Besides, he remarks, that, as these injuries, with loss of substance, are a long time in healing, it would be acting contrarily to the precept of Hippocrates to put burnt patients on low diet. M. Larrey assures us, that he has found this simple treatment, which he calls soothing and gently tonic, almost always successful. (See *Mémoires de Chirurgie Militaire, Tom.* 1, *p.* 93.)

MR. KENTISH'S PLAN.

From what has been stated, it appears, that cold and hot, irritating and soothing, astringent and emollient applications, have all been outwardly employed, in cases of burns, without much discrimination.

But, the internal treatment has always been of one kind, and both the ancients and moderns agree in advising blood-letting, cooling purges, and, in short, the whole of the antiphlogistic plan. Mr Kentish is the only one, who has ventured to put in practice stimulating means, internally, as well as externally. It is to be remarked, at the same time, that Mr. Cleghorn's practice was somewhat analogous to that recommended by the latter gentleman. He condemned purges, and he allowed his patients to take stimulants internally.

The theories advanced by Mr. Kentish, which, however, are very objectionable, lead him to lay down two practical indications, in injuries caused by a pernicious quantity of heat, suddenly applied to a part of the body, and which injuries are attended with increased action. The two indications, for restoring the unity of action, are; first, gradually diminishing the excitement, or action, of the part; secondly, increasing the action of the system to meet the increased action of the part, holding this law as the system in view: *That any part of the system, having its action increased to a very high degree, must continue to be excited, though in a less degree, either by the stimulus, which caused the increased action, or some other having the nearest similarity to it, until by degrees the extraordinary action subsides into the healthy action of the part.*

With this view, holding the part to the fire seems the best mode of relief; but, as parts of the body are injured, to which this cannot be done, the most stimulant applications must be had recourse to; for, in this class, there is little fear of any of them being greater, than that which originally caused the accident. The strongest rectified spirits, made still stronger by essential oils, are proper, and may also be heated as much as the sound parts can bear. These, and many more applications of the same class, says Mr. Kentish, will give the speediest and most effectual relief. These are only to be continued for a certain time, otherwise they may afterwards cause the very ill they were given to cure. They are then to be succeeded by less stimulant applications, until the parts act by common natural stimuli.

The internal mode of relief is to give those substances, which soonest excite the system to great action, such as æther, ardent spirits, opium, wines, &c. by which means the solution of continuity of action is allowed to continue the shortest time possible, and the unity of action restored, which constitutes the cure.

Suppose, for instance, as a local application, we at first apply the strongest alcohol, heated to the degree, which the sound part would bear without injury: it should afterwards be gradually diluted until it becomes proof-spirit, and the heat should be diminished, although gradually, as cold is always pernicious, bringing on that tendency to shiver, which should ever be continually guarded against, as being a most hurtful symptom, and the forerunner of a violent sympathetic fever. To prevent this, the external heat should be kept at a high temperature, and the action of the whole system in as great a degree, as may be safe. By this means, you make the action of the whole meet the increased action of the part, by which, the lessening of the increased action of the part to join the action of the whole, is rendered more easy. Thus, there is, says Mr. Kentish, a unity of intention by both the external and internal means, which leads to the restoration of the unity of action, and thus is the cure performed.

It may be said, these circumstances can only take place when there is an increased action, and, that when the parts are destroyed, other means should be used, such as emollients, &c. In replying to this remark, Mr. Kentish distinguishes burns into two kinds; one, in which the action of the part is only increased; and, another, in which some parts have increased action, while other parts are destroyed. It is of little consequence, says Mr. Kentish, what is applied to the dead part, as the detachment of an eschar depends upon the action of parts, which remain alive, and not upon what is applied to those, which are dead. Mr. Kentish remarks, however, that he never saw an instance of a burn, in which, though some parts were totally destroyed, there were not always other parts, in which there was only increased action. Now as our duty is always to save living parts, our mode of cure, in the first instance, will always be the same, viz. to cure the parts, which have only an increased action, in the doing of which the dead parts will not be the worse, as their separation is a process of the system, which requires time, and, if the injury is to any extent, draws forth the joint efforts of the system, and even, says Mr. Kentish, calls up all the energy of its powers, to violent fever. This state should be supported by every artificial aid, in order to bring the parts to suppuration, otherwise the subject falls in the contest; for, if the living parts have not the power to throw off the dead, the dead will assimilate the living to themselves, and a mortification ensue.

When the living parts have been preserved, (continues Mr. Kentish,) which, according to this treatment, will be in the course of two or three days, the dead parts will be more plainly observed, and the beginning of the process to throw them off will be commencing. This process must be assisted by keeping up the powers of the system against debility, by stimulant medicines and a generous diet. The separation of the eschars will be greatly promoted by the application of the stimulus of heat, by means of cataplasms frequently renewed. These may be made of milk and bread, and some camphorated spirit, or any essential oils, sprinkled upon the surface. Such means need only be continued, until the suppuration is established, as then a different mode must be pursued.

After Mr. Kentish had supported the system to a suppuration, he then found that, gradually desisting from his stimulant plan, diminished the secretion of pus, and wonderfully quickened the healing process.

Thus we see, observes Mr. Kentish, the whole of the former treatment inverted The most gentle soothing means were used externally and internally; these were continued until suppuration took place; and then the system was excited, under an idea of supporting it, which not unfrequently so fatigued the constitution, as to induce a hectic fever. The present mode is the reverse of this. When a part of the frame has been much excited, this part is not allowed to cease to act for want of stimulus, but, is kept in action by an adequate stimulus, which is to be gradually diminished, until the ordinary action returns. With the same view, the internal means are highly stimulant to the whole system, which must be supposed to be in a natural state at the time of the accident.

Thus increasing the action of the whole by strong stimuli, and decreasing the action of the part, by lessening the stimuli, the desired end will be more readily obtained; that is, equilibrium of the action will be restored.

When parts are destroyed, there must be other parts with increased action; and the foregoing mode will be the best for restoring the living parts, and promoting the separation of the dead ones. Suppuration having taken place, the exciting of the system by any thing stimulant, either by food, or medicine, should be cautiously avoided. Should the secretion of pus continue too great, gentle laxatives, and a spare diet, are indicated. If any part, as the eyes, for instance, remain weak, with a tendency to inflammation, topical bleedings, or small quantities of blood taken from the arm, are useful. To defend the new skin, camphorated oil, or camphorated oil and lime-water, in equal parts, are good applications. Wounds of this kind heal very fast, when the diminu-

tion of pus is prevented, by attention to diet: if necessary to keep up the patient's strength, small doses of bark, taken two or three times a day, in some milk, will answer that purpose, and will not excite a quickened circulation, as wine, ale, or spirits, are apt to do. By attention to these principles, (continues Mr. Kentish,) I can truly assert, that I have cured very many extensive and dangerous burns and scalds, in one, two, three, and four weeks, which in the former method would have taken as many months; and some, which I believe to have been incurable by the former method.

After explaining his principles, Mr. Kentish takes notice of the several substances, which have commonly been employed. Of these he would chiefly rely on alcohol, the fluid volatile alkali, æther (so applied as to avoid the cooling process of evaporation,) and spirit of turpentine.

In applying these, we are directed to proceed, as follows: the injured parts are to be bathed, two, or three times over, with spirits of wine, spirits of wine with camphor, or spirit of turpentine, heated by standing in hot water. After this, a liniment, composed of the common yellow basilicon, softened with spirit of turpentine, is to be spread on soft cloth, and applied. This liniment is to be renewed only once in twenty-four hours, and, at the second dressing, the parts are to be washed with proof spirit, or laudanum, made warm. When a secretion of pus takes place, milder applications must be made, till the cure is effected.

The yellow ointment stops the pores of the cloth, impedes evaporation, and thus confines the effect of the alcohol to the burnt surface. The first dressings are to remain on four and twenty hours. Mr. Kentish thinks it of importance, that the injured surface should be left uncovered, as little as possible. It is, therefore, recommended, to have plasters, ready spread, before removing the old ones, and then only to take off one piece at a time.

It will seldom be necessary to repeat the application of alcohol a second time, or that of oleum terebinthinæ. The inflammatory action will be found diminished, and, according to Mr. Kentish's principles, the exciting means should therefore be diminished. Warm proof-spirits, or laudanum, may be substituted for the alcohol, and the unguentum resinæ flavæ is to be mixed with oleum camph. instead of turpentine. If this should be found too irritating, Mr. Kentish recommends ung. saturn. or cer. lap. calaminaris. Powdered chalk is to be used to repress the growth of exuberant granulations, and to absorb the pus. In the cavities of separated eschars, and in the furrows, between sloughs, and the living parts, he introduces powdered chalk. Then a plaster is applied, and, in tedious cases, a poultice over the plaster.

With respect to the internal treatment, the author observes, that great derangement of the system arises in certain persons, from causes, which, in others, produce no effect; and that this depends on a difference in the degree of strength. Hence, he concludes, that as strength resists the sympathetic irritative actions of parts, and weakness induces them, we should, in all cases, make the system as strong as we can, immediately upon the receipt of the injury. In considerable burns, he supposes a disproportion of action to take place, between the injured parts, and the system at large, or what, he styles, a solution of the continuity of action; and, that, by a law of the system, a considerable commotion arises, for the purpose of restoring the equilibrium, or enabling the constitution to take on the action of the part. Hence, Mr. Kentish is of opinion, that the indication is *to restore the unity of action of the whole system, as soon as possible*, by throwing it into such a state as to *absorb the diseased action*, and then gradually bring down the whole to the natural standard of action by nicely diminishing the exciting powers. Æther and alcohol, or other stimulants, are to be immediately given, in proportion to the degree of injury; and repeated, once or twice, within the first twelve hours, and, afterwards, wine or ale is to be ordered, till suppuration takes place, when it will be no longer necessary to excite the system.

In a second essay, on the subject of burns, Mr. Kentish remarks, that, in the first species of burns, *in which the action of the part is only increased*, he has not found any thing better, for the first application, than the heated oleum terebinthinae, and the digestive, thinned with the same. In superficial burns, when the pain has ceased, it will be advisable to desist from this application in about four and twenty hours, as that time in many cases will be sufficient, and, at the second dressing, a digestive, sufficiently thinned with common oil, will be adequate to the case, and, on the third day, we are to begin with the ceratum lap. calaminaris. Mr. K. has frequently seen secondary inflammation excited by the remedy. The most certain remedy, for this unpleasant symptom, is to apply a digestive thinned with oil, or a plaster of cerate, and over that a large warm poultice. The cerate will finish the cure. Should there be much uneasiness of the system, an anodyne, proportioned to the age of the patient, should be given.

The growth of fungus, and the profuse

discharge of matter, are to be repressed, as already mentioned, by sprinkling powdered chalk on the surface, and by the use of purgatives, in the latter stages. The chalk must be very finely levigated.

Mr. Kentish's theories are, certainly, visionary; they may amuse the fancy, but, can never improve the judgment. He is a man, however, who has had superior opportunities of observing this part of practice, and the great success of his plan of treatment has acquired very extensive approbation, although there are still many practitioners, who prefer the common methods, and the antiphlogistic principles. See *B. Bell's System of Surgery; Medical Facts and Observations, Vol. 2; Richter's Anfangsgrunde der Wundarzneykunst, Band* 1. *Earle's Essay on the Means of lessening the Effects of Fire on the Human Body. Kentish's Two Essays on Burns. Larrey, Mémoires de Chirurgie Militaire, Tom.* 1, *p.* 93—96.

BURSÆ MUCOSÆ. These are small membranous sacs, situated about the joints, particularly the large ones of the upper and lower extremities. For the most part, they lie under tendons. The celebrated Dr. A. Monro, of Edinburgh, published a very full account of the bursæ mucosæ, and also of their diseases. These parts are naturally filled with an oily kind of fluid, the use of which is to lubricate surfaces, upon which the tendons play, in their passage over joints. In the healthy state, this fluid is so small in quantity, that it cannot be seen without opening the membrane containing it; but, occasionally, such an accumulation takes place, that very considerable swellings are the consequence. Tumours of this sort are often produced by bruises and sprains, and, now and then, by rheumatic affections. These swellings are not often attended with much pain, though, in some cases, it is very acute, when pressure is made with the fingers. The tumours yield, in a certain degree, to pressure; but, they rise again, with an appearance of elasticity, not remarked in other sorts of swellings. At first, they appear to be circumscribed, and confined to a small extent of the joint; but, sometimes, the fluid, forming them, is so abundant, that they extend over a great part of the circumference of the limb. The skin, unless inflamed, retains its natural colour.

In this morbid state of the bursæ mucosæ, they contain different kinds of fluids, according to the cause of the disease. When the tumour depends on a rheumatic affection, the contents are ordinarily very fluid. They are thicker, when the cause is of a scrophulous nature. When the disease is the consequence of a bruise, or sprain, the effused fluid often contains hard concretions, and, as it were, cartilaginous ones, which are sometimes quite loose, and, more or less, numerous. Such substances may frequently be felt, when the tumour is examined with the fingers.

In practice, such distinctions are not of much consequence. While the swellings are not very painful, an attempt may be made to disperse them, by warm applications, friction (particularly, with camphorated mercurial ointment,) or blisters, kept open with the savin cerate. But, if these tumours should become very painful, and not yield to the above methods, Dr. Monro recommends opening them; a practice, however, which can seldom be really necessary, or proper. This author was continually alarmed at the idea of the bad effects of air admitted into cavities of the body, and, hence, in the operation even of opening the bursæ mucosæ, he is very particular in directing the incision in the skin, not to be made immediately opposite that made in the sac. Care must also be taken to avoid cutting the tendons, near the swelling.

Dr. Monro has seen cases, in which amputation became indispensable, in consequence of the terrible symptoms following the opening of bursæ mucosæ.

On account of such evil consequences, which are imputed to the air, though they would as often arise, where the same practice pursued in a situation, in which no air could have access at all, it has been recommended to pass a seton through the swelling, and to remove the silk, after it has remained just long enough to excite inflammation of the cyst, when an attempt is to be made to unite the opposite sides of the cavity by pressure.

I have never seen any swelling of this kind, which could not be discussed, by the means usually employed for promoting the absorption of other tumours. Indeed, the treatment should be very like that of Hydrops articuli. (See *Joints.*)

Consult *Monro's Works by his Son*; and *Latta's System of Surgery.*

C.

CÆSAREAN OPERATION. (Pliny, book 7. of his Natural History, gives us the etymology of this operation. *Auspicatiùs* (says he) *enectâ parente gignuntur, sicut Scipio Africanus prior natus, primusque Cæsarum à cæso matris utero dictus; quâ de causâ cæsones appellati. Simili modo natus est Manlius qui Carthaginem cum exercitu intravit.*)

From this passage, we are to infer, that the Cæsarean operation is extremely ancient, though no description of it is to be found in the works of Hippocrates, Celsus, Paulus Ægineta, or Albucasis. The earliest account of this operation, to be found in any medical work, is that in the Chirurgia Guidonis de Cauliaco, published about the middle of the fourteenth century. Here, however, the practice is only spoken of, as proper after the death of the mother, and is alleged to have been adopted only at such a conjuncture in the case of Julius Cæsar. (See *Cap. de Extractione Fœtus.*) Vigo, who was born towards the close of the fifteenth century, takes no notice of the Cæsarean Operation; and Paré, who greatly improved the practice of midwifery, thinks this measure only allowable on women, who die undelivered. (*De Hominis Generatione, cap.* 31.) Rousset, who was cotemporary with Paré, collected the histories of several cases, in which the operation was said to have been successfully performed, and, after the publication of these, the subject excited more general interest, as we shall presently relate.

By the *Cæsarean operation*, is commonly understood that, in which the fœtus is taken out of the uterus, by making an incision into the abdomen, and through the parietes of that viscus. The term, however, in its most comprehensive sense, is applied to three different proceedings. It is sometimes employed to denote the incision, that is occasionally practised on the cervix uteri, in order to facilitate delivery; but, this particular method is named the *Vaginal Cæsarean Observation*, for the purpose of distinguishing it from the former, which is frequently called, by way of contrast, the *Abdominal Cæsarean Operation*. With these cases, we have also to class the incision, which is made in the parietes of the abdomen, for the extraction of the fœtus, when, instead of being situated in the uterus, it lies in the cavity of the peritoneum, in consequence of the rupture of the womb, or in the ovary, or Fallopian tube, in consequence of an extra-uterine conception. This last operation, as Sabatier has remarked, is a species of gastrotomy. However, as it is very analogous to the abdominal and vaginal Cæsarean Operations, it can be most conveniently treated of in the present article. Following the plan, adopted by Sabatier, let us commence with the

VAGINAL CÆSAREAN OPERATION.

A variety of causes, says Sabatier, may render this practice indispensable. A scirrhous hardness of the neck of the uterus is the most frequent. When the induration is such, that the cervix cannot become dilated, and the patient is exhausting herself with unavailing efforts, the parts should be divided in several directions. This has been successfully done under various circumstances. Cases have even been met with, in which the cervix uteri presented no opening at all, and yet the preceding operation proved quite effectual. Such is the example, which Doctor Simson has inserted in the third volume of the Edinburgh Essays. A woman, forty years of age, became pregnant, after recovering from a difficult labour, in which the child had remained several days in the passage. She had been in labour sixty hours; but the neck of the womb had no tendency to dilate. Dr. Simson, perceiving that its edges were adherent, and left no opening betwixt them, determined to practise an incision, with the aid of a speculum uteri. The bistoury penetrated to the depth of half an inch, before it got quite through the substance, which it had to divide, and which seemed as hard as cartilage. As the opening did not dilate, in the efforts, which the woman made, it became necessary to introduce a narrow bistoury, on the finger, in order to cut this kind of ring in various directions. There was no hemorrhage; and the only additional suffering, which the patient encountered, arose from the distention of the vagina. As the child was dead, Dr. Simson perforated the head, in order to render the delivery more easy.

Strong convulsions, at the moment of parturition, may create a necessity for the vaginal Cæsarean Operation. These sometimes subside, as soon as the membranes are ruptured, and the waters discharged, so as to lessen the distention of the womb. However, if the convulsions continue, and the cervix uteri is sufficiently dilated, the child should be extracted by the forceps, or by the feet, according as the presentation may happen to be. On this subject, Baudeloque has recorded a fact, which was communicated

to the Academy of Surgery by Dubocq, professor of surgery at Toulouse. The woman was forty years of age, and had been in convulsions two days. She was so alarmingly pale, that she could scarcely be known. Her pulse was feeble, and almost extinct, and her extremities were cold, and covered with a clammy perspiration. The edges of the opening, which was about as large as a crown piece, felt, as it were, callous, and hardly had this aperture been dilated, when delivery took place spontaneously. The child was dead. The symptoms were appeased, and the woman experienced a perfect recovery.

A considerable obliquity of the neck of the womb, combined with a pelvis, of which the dimensions are small, may also be a reason for the performance of the vaginal Cæsarean Operation. Not that such obliquity always occasions that of the rest of the uterus; nor is the neck of this viscus invariably directed towards that side of the pelvis, which is opposite to its fundus, although this is sometimes the case. In the latter circumstance, as the contractions of the uterus do not produce a dilatation of its cervix, which rests upon the bones of the pelvis, the adjacent part of that organ is dilated and pushed from above downwards, so as to present itself in the form of a round smooth tumour, without any appearance of an aperture. Such a case may have fatal consequences. Baudeloque furnishes us with an instance. A woman, in her first pregnancy, not being able to have the attendance of the accoucheur, whom she wished, put herself under the care of a midwife, who let her continue in labour-pains during three days. When the accoucheur came, on being sent for again, the child's head presented itself in the vagina, covered with the womb. The portion of the uterus, which included the fetus, was in a state of inflammation. The os tincæ was situated backward, toward the sacrum, hardly dilated to the breadth of a penny piece, and the waters had been discharged a long time. The patient was bled, and emollient clysters were administered. All sorts of fomentations were employed. She was laid upon her back, with her pelvis considerably raised. The accoucheur had much difficulty in supporting the head of the child, and keeping it from protruding at the vulva, enveloped, as it was, in the uterus. Notwithstanding such assistance, the patient died.

So fatal an event, says Sabatier, might have been prevented, by making the woman lie upon the side, opposite the deviation of the uterus, and employing pressure from above. If these proceedings had failed in bringing the os tincæ toward the centre of the pelvis, this opening might have been brought into such position, by means of the finger, in the interval of the pains, and kept so, until it were sufficiently dilated for the membranes to protrude.

This is what was done by Baudeloque in one case, where the womb inclined forward and to the right. The os tincæ was situated backward. The waters escaped, and the head advanced towards the bottom of the pelvis, included in a portion of the uterus. The whole of the spherical tumour, which presented itself, could be felt with the finger; but, no opening was distinguishable; and the swelling might also be seen, on separating the labia from each other, and opening the entrance of the vagina. It became necessary to keep the patient continually in bed, and to have the finger incessantly introduced; but, she was not sufficiently docile to submit to such treatment. Fortunately, the unexpected appearance of two officers of justice, forty-eight hours after the commencement of the labour, had the effect of making her more manageable. It was time for her to become so; for, the uterus had now become tense, red, and painful. The abdomen was also so tender, that it could scarcely bear the contact of the clothes. Febrile symptoms had begun, and the ideas were beginning to be confused. Baudeloque made her lie down; and he pressed, with one hand, on the abdomen, for the purpose of raising the uterus, while, with the other, he pushed the head a little way back, in order that he might reach the os tincæ, which he now brought with his finger toward the centre of the pelvis, and kept there for some time. The efforts of the patient being thus encouraged, she was delivered in about a quarter of an hour. The infant was of a thriving description, and the case had a most favourable termination.

When the obliquity of the uterus is such, that the os tincæ cannot be found, and the mother and fetus are both in danger of perishing, it is the duty of the practitioner to open the portion of the womb, that projects towards the vulva. Lauverjat met with a case of this description in his practice. A woman, pregnant with her first child, suffered such extreme pain in her labour, that Lauverjat was solicitous to ascertain the real state of things. He was surprised to find the vulva completely occupied by a body, which even protruded externally, and yielded to the pressure of the fingers, except during the labour-pains. In examining this tumour, he could only find at its circumference a cul-de-sac, half an inch deep, without any aperture, through which the child could pass.

Other practitioners, who were consulted about this ex raordinary case, were also anxious to learn what had happened. They found in the tumour a laceration, which only affected a part of the thickness of its parietes. This laceration was deemed the proper place for making an incision. The operation having been done, the finger was passed into the cavity, in which the child was contained. A large quantity of turbid fluid was discharged. The child presented, and passed through the opening, which had been formed, producing a trivial laceration on the right side. Lauverjat, having passed his hand into the uterus, was unable to find either the os tincæ, or the cervix. No particular indisposition ensued, and the lochia were discharged through the wound, which gradually closed. In the course of two months, the os tincæ and neck of the uterus, were in their natural position again. (*Lauverjat Nouvelle Methode de Pratiquer l'Operation Cesarienne, Paris*, 1788.)

When the case is a scirrhous induration of the cervix uteri, or a laceration of the parietes of this viscus, at the place, where it projects into the vagina, the vaginal Cæsarean Operation appears to be attended with no difficulty. It is performed with a blunt-pointed bistoury, the blade of which is wrapped round with lint, to within an inch of the point. The instrument is to be introduced, on the index finger, into the opening presented by the uterus, and the aperture is to be properly enlarged, from within outwards, in various directions. But when the scirrhous hardness of the cervix presents no opening at all, or when the part of the uterus projecting in the vagina is entire, the incision should be made from without inwards, with the same kind of knife. Too much caution cannot be used in introducing the instrument, in order that no injury may be done to the child, which lies directly beyond the substance, which is to be divided. No general direction can here be offered, except that of proceeding slowly, and of keeping the index finger extended along the back of the knife, so that it may be immediately known, when the instrument has cut through the substance of the womb, into the cavity of which the finger ought to pass as soon as the knife. If it should be necessary to extend, or multiply the incisions, the cutting instrument should be regulated, in a similar manner, with the same finger. The cervix uteri having been divided, the expulsion of the child is either to be left to nature, or to be promoted by the ordinary means. The operation, that has been described, requires no dressings. However, if the bleeding should prove troublesome, we are recommended to apply to the incision a dossil of lint, wet with vinegar, or spirit of wine. (See *Sabatier's Médecine Opératoire, Tom.* I.)

ABDOMINAL CÆSAREAN OPERATION.

This is a far more serious operation, than that which we have just now been treating of, and it is the proceeding, to which the term Cæsarean Operation is more particularly applied.

There are three cases, in which this operation may be necessary. 1. When the fœtus is alive, and the mother dead, either in labour, or the last two months of pregnancy. 2. When the fœtus is dead, but cannot be delivered in the usual way, from the deformity of the mother, or the disproportionate size of the child. 3. When both the mother and child are living, but delivery cannot take place from the same causes, as in the second instance.

Both the mother and child, if accounts can be credited, have often lived after the Cæsarean operation, and the mother even borne children afterwards. Heister gives a relation of such success, in his Institutes of Surgery, cap. 113. See also *Mem. de l'Acad. de Chirurgie, Tom.* 1, *p.* 623, *Tom.* 2, *p.* 308, *in* 4*to. Edinb. Med. Essays, Vol.* 5, *art.* 37, 38, *and Edinb. Med. and Surgical Journal, Vol.* 4, *p.* 179.

In England, the Cæsarean operation has almost always failed. Mr. James Barlow, of Chorley, Lancashire, succeeded, however, in taking a fœtus out of the uterus by this bold proceeding, and the mother was perfectly restored to health. (See *Haighton's Enquiry concerning the true and spurious Cæsarean operation, and Barlow's account in the Med. Reports and Researches*, 1798.)

This is the only woman, who in this country has had the good fortune to survive the Cæsarean operation, though it is said, that there are eighteen examples recorded, in which it has been performed in Great Britain. Ten of the children, however, are stated to have been saved. On the continent, the practice has proved infinitely more successful; for, of 231 cases of this operation, to be found in the records of medicine, 139 are said to have terminated successfully. (*Kellie, in Edinb. Med. and Surgical Journal, Vol.* 8, *p.* 17.)

When the fœtus is contained in the womb, and cannot be expelled, by reason of the invincible obstacles already mentioned, the Cæsarean operation should be practised, before the mother, and fœtus, both perish from the violence of the pains, hemorrhage, convulsions, &c.

For this purpose, it is necessary to make an extensive incision in the inte-

guments of the abdomen, and in the uterus. Some have thought, that cutting the parietes of the belly was mortal, while others have believed a wound of the uterus to be so. Hence, such persons have condemned the operation on the principle, that religious reasons do not authorize taking one life to save another. All the opponents of the Cæsarean operation fear the hemorrhage, which, they say, must follow. Indeed, if the uterus were not to contract sufficiently, when the fœtus and after-birth have come away, the bleeding would really be perilous. But when, by means of the Cæsarean operation, the fœtus is extracted, together with the placenta and membranes, the uterus will then contract, just as it does after a natural labour. Besides, even when the mother is alive, the operation is not commonly done, till the uterus evinces a propensity to deliver itself, and begins to contract. The womb being delivered of its contents, the incision becomes closed, the vessels obliterated, and there is no fear of hemorrhage. The wound must also make so irritable an organ more disposed to contract; but, whatever arguments may be adduced, it is enough to say in this case: *Artem experientia fecit, exemplo monstrante viam.* Rousset, in 1581, published a work, in French, intitled, *Hystérotomie, ou l'Accouchement Césarien.* This book, in 1601, was translated into Latin, and enlarged with an appendix by the celebrated Bauhin. Even then, the practice of the Cæsarean operation on the living mother had its defenders. Bauhin relates that, in the year 1500, a sow-gelder performed the Cæsarean operation on his wife, *tam feliciter, ut ea posteà gemellos et quatuor adhuc infantes enixa fuerit.* This is said to be the first instance, in which the operation was ever done on the living mother with success. Many other cases were afterwards collected, and published.

The possibility of operating successfully on the living mother has been demonstrated, with so much perspicuity and accuracy, by M. Simon, in *Tom.* 1, *de l'Acad. de Chirurgie, in* 4*to.* that there cannot be a doubt of the thing having been frequently practised with success. Here we are presented with a collection of sixty-four Cæsarean operations, more than a half of which had been done on thirteen women. Some of these had undergone the operation once, or twice; others five or six times. There was one woman in particular, who had undergone it seven times, and always with success. This seems to prove, notwithstanding all assertions to the contrary, that the operation, for the most part, succeeds. But, if the life of the mother should not invariably be preserved, the Cæsarean operation ought not to be rejected on this account; it ought always to be done, when relief cannot be obtained by other means; just as amputation and lithotomy are practised, though they are not constantly followed by success. Would any thing be more cruel, than to abandon a mother and her child, and leave them to perish, while there is any hope of saving them both? It is true, that when a pregnant woman dies of any inward disorder, and not from the pains, and efforts of labour, the fœtus is sometimes still alive in the uterus; but, in cases of death, after difficult labours, and the great efforts, made by the uterus to overcome the obstacles to parturition, the fœtus is generally dead; and the operation therefore is less likely to be availing. (See *Bertrandi Traité des Opérations de Chirurgie, Chap.* 5.)

It is the opinion of the best writers upon this subject, that whenever a woman dies, at all advanced in pregnancy, the performance of the Cæsarean operation is highly proper. Experience has proved, that when the fœtus has not attained the period, at which parturition commonly happens, it will sometimes survive the operation a considerable time, and that, when it is full grown, its life may be most happily preserved. Although instances are cited, in which the fœtus in utero has been found alive upwards of four and twenty hours after the death of the mother, little stress should be laid on such prodigies. The operation ought to be done without any delay. Even then, we are not certain of saving the infant's life. The greater number of fœtuses perish at the same time as the mother, and from the same causes. If the mother should happen to die in labour, and the neck of the uterus were suffi ciently dilated, or disposed to be so, an attempt should be made to accomplish delivery in the ordinary way; for, examples have occurred, in which, women, supposed to be dead in this circumstance, were in reality alive. Hence, we find, that the senate of Venice formerly enacted a law, by which practitioners were liable to punishment, in case they neglected to operate with as much caution on a pregnant woman, supposed to be dead, as on the living subject. (*Richerand, Nosographie Chirurgicale, Tom.* 4, *p.* 395 *Edit.* 2.) In the Journal de Savans de Janvier, 1749, the following case, confirming the propriety of such caution, was inserted by M. Rigaudeaux, surgeon to the Military Hospital at Douay. This practitioner, having been sent for to a woman, to whose residence he was unable to proceed, till two hours after her apparent death, he had the sheet, with which she was covered, removed, and

perceiving that the body retained its suppleness and warmth, he tried whether the fœtus could not be extracted in the ordinary way, which was easily effected as soon as the feet were got hold of. The first endeavours to save the child, were very unpromising; but, after a few hours, they had the desired effect. As the woman continued in the same state, five hours afterwards, Rigaudeaux recommended, that she might not be buried, before her limbs were quite cold and stiff. He afterwards had the satisfaction to learn that she was also restored to life. This remarkable case happened on the 8th of June, 1745, and both the mother and child were living, at the period, when Rigaudeaux published the observation.

Supposing, however, delivery in the ordinary manner to be impracticable, at all events, the Cæsarean operation ought to be performed, with the same cautions, as if the mother were alive, only one incision being made for the purpose of opening the uterus.

Almost all the insurmountable obstacles to delivery originate from the bad conformation of the pelvis, which depends upon rachitis; though it is not an invariable consequence of it, since there are women, extremely deformed, in whom no imperfection of the pelvis exists, while it prevails in others, whose shape is but trivially disfigured. An examination of the dimensions of the pelvis is the right mode of ascertaining, whether there is really such an impediment to parturition. In order that the dimensions may not be an obstacle to delivery, the distance, between the upper edge of the sacrum and the os pubis, ought to be three inches and a half; and the distances, between the tuberosities of the ischium, and between each of these protuberances and the point of the os coccygis, three inches. Women have indeed been known to be delivered, without assistance, although the first of the above distances, was only two inches and a half; but, then the heads of the children were so elongated, that the great diameter was nearly eight inches, while that, which extends from one parietal protuberance to the other, was reduced to two inches five or six lines, and the infants were lifeless. If they are to be born alive, they must be taken out of the womb by the Cæsarean operation; but, the latter proceeding should never be adopted, without a certainty, that they are actually living; for, when dead, they may be extracted in a way, that is attended with much less risk to the mother.

It is not always an easy matter to ascertain with certainty, whether a fœtus in utero, be living, or dead. If it has entirely ceased to move, after being affected with a violent motion, the probability is, that it is no longer alive. But, to be certain, manual examination is necessary, which may be practised in two ways. One consists in pressing upon the uterus, through the parietes of the abdomen. If the child lives, such pressure makes it move, and the motion can be plainly felt, and distinguished. In the other method, one hand is employed in pressing upon the uterus externally, while, with the fingers of the other hand, passed up the vagina, corresponding pressure is also to be made. The uterus is likewise to be allowed to descend as far as possible, in order to induce the fœtus to move. When no decisive indications can be thus obtained, it becomes necessary to rupture the membranes, if they have not already given way, introduce the hand into the uterus, and put a finger into the child's mouth, for the purpose of making it move its tongue. The finger may also be applied to the region of the heart, so as to examine, whether this organ is beating; and the umbilical cord may be touched, in order to ascertain, whether there is still a pulsation in it. When none of these proceedings furnish unequivocal information, the conclusion is, that the child is dead, and its extraction is indicated, unless the narrowness of the parts be such, that the hand cannot be passed into the uterus, in which case, the Cæsarean operation is indispensable.

But, how are we to form a judgment respecting the dimensions of the pelvis? And how can we know, whether that diameter, which extends from the upper edge of the sacrum to the os pubis, is long enough to allow the passage of the child? The proper conformation of this part is known, by the roundness and equality of the hips, both in the transverse and perpendicular direction; by the projection of the pubes; by the moderate depression of the sacrum; by an extent of four or five inches from the middle of this depression to the bottom of the os coccygis; by an extent of seven or eight inches from the spinous process of the last lumbar vertebra to the highest part of the mons veneris, in a woman moderately fat; and by there being an interspace of eight or nine inches, between the two anterior superior spinous processes of the ossa ilium.

These general calculations, however, are insufficient. In order to acquire more correct opinions, double compasses must be used. The branches of the first being applied to the top of the sacrum, and middle of the mons veneris, three inches are to be deducted from the dimensions, indicated by the instrument; viz. two

inches and a half for the thickness of the upper part of the sacrum, (which is said to be constant in subjects of every size,) and half an inch for that of the os pubis. In women, who are exceedingly fat, some lines must also be deducted on this account. Hence, when the total thickness of the pelvis, measured in this direction, is seven inches, there will remain four for the distance from the upper part of the sacrum to the os coccygis, or for the extent of the lesser diameter of the upper aperture of the pelvis.

For taking the measurement internally, a kind of sector was invented by M. Coutouly. It bears a considerable resemblance to the instruments, employed by shoemakers for measuring the feet. It is passed into the vagina, with its two branches approximated, until one arrives opposite the anterior and upper part of the sacrum, when the other is to be drawn outward, so as to be applied to the pubes. The distance, between the branches, is judged of by the graduations on the instrument. This was named by its inventor a pelvimeter. According to M. Sabatier, it is not always easy to place it with accuracy; its employment is attended with some pain; and there are particular cases, in which it cannot be used.

Instead of this contrivance, the celebrated Baudeloque has recommended a means, which seems to be very safe and simple. The index finger of one hand is to be introduced into the vagina to the upper part of the projection of the sacrum. The finger, having the radial edge turned forwards, is then to be inclined anteriorly till it touches the arch of the pubes. The point of contact being then marked with the opposite hand, the length from the point in question to the end of the finger is to be measured. This length, which indicates the distance between the sacrum and the bottom of the symphysis pubis, usually exceeds that of the lesser diameter of the pelvis by about six lines. Baudeloque acknowledges, that this measurement is not exactly accurate; but, he believes, it will do very well, because, unless the narrowness of the pelvis be extreme, two, or three lines hardly make any difference in the facility of parturition.

The pelvis may be everywhere well formed, and yet present an insurmountable obstacle to delivery, in case an exostosis, lessening its dimensions, should exist on one of the bones, which compose this part of the skeleton. Pineau met with a case of this description in a woman, who died undelivered. The tumour originated from one of the ossa pubis. A steatomatous swelling, situated with the head of the child in the upper aperture of the pelvis, might produce the same effect, unless it were detected, and could be pushed out of the way, so as to make room for the fœtus to pass. Baudeloque mentions a swelling of this kind. It was six or seven inches long, and an inch and a half in width. The extremity of it, which was as large as half an hen's egg, had a bony feel, and contained nine well-formed teeth, the rest of the mass being steatomatous. It had descended into the lesser pelvis, below the projection of the sacrum, and a little to one side. It might have been taken for an exostosis of this last bone. The labour pains continued sixty hours, and the propriety of performing the Cæsarean operation was under consideration. Baudeloque was averse to this proceeding. He recommended turning the child, and extracting it by the feet, because he thought, that the pelvis was sufficiently capacious to admit of delivery. The event proved, that it was three inches nine lines, from before backward, and four inches nine lines transversely. The fœtus was soon easily extracted. The assistance of the forceps was necessary to get out the head. The child was still-born. The mother, exhausted with numerous unavailing efforts, only survived between fifty and sixty hours. Baudeloque was of opinion, that a defective regimen also tended to occasion her death.

Among the insurmountable obstacles to delivery may be reckoned such a displacement of the uterus, that this viscus protrudes from the abdomen, and forms a hernia. The records of surgery have preserved some examples of this extraordinary occurrence. Twice has the Cæsarean operation been performed, and, in one of the cases, the woman survived so long, that hopes were entertained of her recovery. Indeed, as Sabatier observes, why should not the operation succeed in such a case, where the uterus is only covered by the integuments, and there is no occasion to cut into the abdomen, just as well as other instances, in which it is indispensable to divide the muscles, and open the cavity of the belly? In the other case on record, delivery was effected in the ordinary way, either by raising the abdomen, and keeping it in this position with towels skilfully placed, or by making pressure on the uterus, which had the beneficial effect of making this organ resume its proper situation.

Having shewn the absolute necessity for the Cæsarean operation, under certain circumstances, it remains to consider the proper time for performing it, the requisite preparatory means, and the method of operating.

With regard to the time of operating, practitioners do not agree upon this

point; some advising the operation to be done, before the membranes have burst, and the waters been discharged; others, not till afterwards. The arguments, in favor of the first plan, are, the facility with which the uterus may be opened without any risk of injuring the fœtus, and the hope that the viscus will contract with sufficient force to prevent hemorrhage. The advocates for the second mode believe, that, in operating after the discharge of the waters, there is less danger of the uterus falling into a state of relaxation, in consequence of becoming suddenly empty after being fully distended, and that this method does not demand so extensive an incision. Hence, they recommend, as a preliminary step, to open the membranes. Whatever conduct is adopted, it is essential, that the labour should be urgent and unequivocal, that the cervix uteri should be effaced, and that the os tincæ should be sufficiently dilated to allow the lochia to be discharged; but, at the same time, says M. Sabatier, if the operation is not to be done till after the escape of the waters, there ought not to be too much delay, lest the patient's strength should be exhausted, and the violent efforts of labour should bring on an inflammatory state of the parietes of the uterus.

The propriety of emptying the rectum and bladder is so evident, that it is unnecessary to insist upon it. This precaution is more particularly requisite in regard to the latter of these viscera, which has been known to rise so much over the uterus, as to conceal the greater part of it. Baudeloque had occasion to remark this circumstance, in a woman, upon whom he was operating. The bladder ascended above the navel, and presented itself through the whole extent of the opening made in the parietes of the abdomen.

The instruments, dressings, &c. which may be wanted, are two bistouries, one with a convex edge, the other having a probe-point; sponges; basins of cold water acidulated with a little vinegar; long strips of adhesive plaster; needles and ligatures; lint; long and square compresses; a bandage to be applied round the body, with a scapulary, &c.

For the purpose of undergoing the operation, the patient should be placed at the edge of her bed, well supported; her chest and head should be moderately raised; her knees should be somewhat bent, and held by assistants, one of whom ought to be expressly appointed to fix the uterus by making pressure laterally, and from above downward, so as to circumscribe, in some degree, the swelling of the uterus, and prevent the protrusion of the bowels. These things being attended to, the integuments are to be divided with the convex edged bistoury to the extent of at least six inches. The place, and direction of this incision, differ with different operators.

In the most ancient method, it was customary to make the incision between the outer edge of the rectus muscle, and a line, drawn from the anterior superior spinous process of the ilium, to the junction of the bone of the first rib with its cartilage. This cut was begun a little below the umbilicus, and was continued downward as far as an inch above the pubes. After the integuments had been divided, the muscles, aponeuroses, and peritoneum were cut, and the uterus cautiously opened. The left index finger was then introduced into this viscus, the wound of which was dilated by means of the probe-pointed bistoury.

This manner of operating is subject to great inconveniences. The place, where the incision is made, is the situation of muscles, the fibres of which have a different direction, and, on contracting, separate the edges of the wound, and make it gape. The considerable blood vessels, which ramify there, may be the source of perilous bleeding. The bowels can protrude in that situation more readily, than anywhere else. When the position of the uterus is oblique, and when, consequently, the edges of this viscus are turned forward and backward, and its surfaces to the right and left, the incision will be made in one of the lateral portions of the uterus, where the trunks of its blood vessels are known to be situated, and sometimes even the Fallopian tube and ovary may be cut. The fibres of the uterus are cut transversely, so that the edges of the incision are apt to gape, instead of being in contact. This last circumstance may the more readily permit the lochia to escape into the abdomen, inasmuch as the uterus is cut nearly through its whole length, and there is no cavity, in which they can accumulate, in order to be discharged through the cervix of that organ.

The linea alba has been frequently considered the most eligible place for making the incision. As Sabatier informs us, it was the method adopted by Soleyrès, and Deleurye, and it has the recommendation of Baudeloque, because there are fewer parts to be cut, and, when the uterus is exposed, an incision, parallel to its principal fibres, may be made in its middle part. Soleyrès thought that this plan of operating originated with Platner and Guérin, a surgeon at Crepi en Valois. Platner says; *Incidantur juxta lineam albam, plagâ majore quæ ab umbilico ad ossa pubis ferè descendit, tùm abdominis musculi, tùm peritonæum, ubi tandem vitandum ne violetur arteria epigastrica.* M.

Guérin, in his case, made an incision, six inches long, which began a little above the umbilicus, and extended to within an inch and a half of the pubes. He afterwards divided the fat, muscles, and peritoneum, in order to get at the uterus, the anterior part of which was opened, the wound being made rather in the body, than the fundus of that viscus. Deleurye will not admit, that these writers actually divided the linea alba, because they speak of having cut muscles, which in reality do not exist in that situation; and he attributes the honour of the invention to Varoquier, a surgeon of Lisle, in Flanders; but, the method was known to Mauriceau, as we may be convinced of by the following passage, extracted from the chapter, in which he treats of the Cæsarean operation, "*La plupart veulent qu'on incise au côté gauche du ventre; mais l'ouverture sera mieux au milieu entre les muscles droits, car il n'y a en ce lieu, que les tégumens et les muscles à couper.*" Lauverjat, who has made this remark, and cited the Latin edition of Mauriceau, page 247, also observes, that the incision in the linea alba was practised by a cotemporary of La Motte, a circumstance which Sabatier has not been able to ascertain. (*Medecine Operatoire, Tom.* 1.) The following would be the proper manner of operating in the linea alba. The operator should first divide the integuments perpendicularly, so as to expose the linea alba, making the wound about six inches long. An opening should then be carefully made through the aponeurosis, into the abdomen, either at the upper, or lower part, of the linea alba in view. A curved bistoury is then to be introduced into the opening, and the tendon and peritoneum cut from within outward, as far as the extent of the wound in the integuments. The latter cut should be cautiously made, with the crooked bistoury, guided by the forefinger of the left hand, lest any of the intestines should be accidentally injured. The uterus must next be carefully opened, making an incision in it, of the same length, as the preceding wound. The fœtus is to be taken out through the wound, and then the placenta and membranes. In this way, M. Artiste lately operated, so as to save both mother and child. (See *Edinburgh Surgical Journal, Vol.* 4, *p.* 178.)

This mode of operating, as Sabatier observes, gives more hopes of success, than the plan first described; but he argues, that such hopes have not been realised by experience. Though the operation may have been more easy, he contends, that the edges of the wound in the skin, and those of the incision in the uterus, have had no tendency to remain in a state of proximity to each other, because the linea alba is the point, on which all the large muscles of the abdomen principally act, and because the contraction of the uterus invariably takes place from above downwards. Sabatier alleges, the wound in this viscus has been found to incline to one of its sides, for the same reasons, as occur, in operating at one of the sides of the abdomen. He also states, that the incision has been concealed under the integuments of the upper part of the pubes, and that the presence of the bladder hinders the wound from being carried sufficiently far down. Perhaps, says he, a part of these inconveniences, which depend upon the contraction of the uterus, and the return of this organ to its natural state, might be avoided, by extending the incision to its highest part. Baudeloque has advised this plan, with a view of preventing the fatal extravasations in the abdomen, which frequently follow this operation. Sabatier, however, has doubts, whether, in operating in the linea alba, the wound can be carried high enough. Besides, he maintains, that this precaution would not prevent the wound from gaping, nor the greater tendency of the lochia to be extravasated in the abdomen, than to accumulate in the uterus, and be discharged through the os tincæ. (*Médecine Opératoire, Tom.* 1, *p.* 274—275.)

In this country, (where, indeed the Cæsarean operation, has proved most unsuccessful) the linea alba is preferred, I believe, by the majority of practitioners. That the method is not always attended with the formidable objections, urged against it by Sabatier, is quite certain: the case, lately published by Dr. Chisholm, is a decisive proof of this assertion. (See *Edinb. Med. and Surgical Journal, Vol.* 4, *p.* 178, 179.)

There is a third method of performing the abdominal Cæsarean operation. It consists in making a tranverse incision, five inches in length, through the parietes of the abdomen, between the rectus muscle and the spine, and in a situation more or less high, according to the more or less elevated position of the uterus. This plan was recommended by Lauverjat, in a publication entited, "*Nouvelle Méthode de Pratiquer l'Opération Césarienne, Par.* 1, 1788." Lauverjat acknowledges, that the method has been successfully practised by different persons before himself, and, especially, in one instance, which was particularly remarkable, as, in consequence of the first incision having been made too high up, it became necessary to make a second one, which extended obliquely from the other. However, according to Sabatier, Lauverjat has as much merit, as if he had invented the plan, since he has given a better ex-

planation of its advantages, than any of his predecessors.

The side, on which the operation is to be done, is in itself a matter of indifference. But, if the liver or spleen were to project, one ought to avoid it. Also, if the uterus were to incline more towards one side, than the other, it would be proper to operate on that side, where the uterus could be most conveniently got at. The patient being put in a proper position, and held by assistants, and her abdomen kept steady by an attendant, who must apply the palms of his hands to the sides of the uterus, the integuments, muscles, and peritoneum are to be divided, with the usual precautions. The uterus is then to be opened, and the wound in it enlarged in the requisite degree, by means of a probe-pointed bistoury. Should the placenta present itself, care must be taken not to injure it, for fear of opening one of the arteries of this mass, which communicate with the umbilical arteries of the child, or of leaving a portion of it in the uterus; but, it should be separated, in order to facilitate breaking the membranes at its circumference. The child is next to be extracted. This part of the operation is subject to no general rule. Delivery being accomplished, we are recommended to introduce through the vagina anodyne injections, in order to lessen spasm, and wash out the coagula. This method is preferable to that of clearing out the uterus with the hand. Sabatier most properly condemns the plan, formerly advised by Rousset and Ruleau, of passing up the neck of this viscus a bougie for the purpose of washing out the lochia, as well as the absurd proposal of employing a seton to promote their escape. Should the lochia not pass readily outward, we are recommended to introduce the finger occasionally into the cervix uteri, so as to free it from the coagula, which may obstruct it.

Sabatier observes, that nearly all authors, who have spoken of the Cæsarean operation, whether performed at the sides of the abdomen, or in the linea alba, have advised keeping the edges of the wound in the skin, muscles, and peritoneum together, by means of the interrupted, or twisted suture, care being taken to place at the lower part of the incision a tent, in order to prevent adhesion, and leave a free issue for whatever discharge may take place from the abdomen. Others have been content with recommending the use of adhesive plasters and the uniting bandage.

Sabatier condemns sutures as painful and irritating, and he states, that the other means only act upon the skin, without fulfilling the object in view, because the integuments have no fixed point, and the divided muscles tend to contract. Sabatier assures us, that, in the last mode of operating, the edges of the wound may be brought into contact by merely laying the patient upon her side. Besides, he remarks, that there are not many muscular fibres cut, those of the transversalis being only separated from each other. He affirms, that this manner of operating also favours the approximation of the edges of the wound in the uterus, in consequence of this organ contracting most extensively in the perpendicular direction. It is likewise asserted, that, as the uterus has only been opened at its upper part, it affords in its middle and lower portions a large cavity, which does not communicate with the abdomen, and in which the lochia may easily accumulate, and afterwards be discharged by the natural way. The only dressings, advised by Sabatier, are a large pledget, compresses, and a moderately tight bandage round the body. These are to be changed, when soiled with the matter or discharge. In this country, practitioners would not neglect to bring the edges of the wound, as much as possible together, by means of strips of adhesive plaster; for, though they may not act with so much effect in this situation as many others, they undoubtedly assist in promoting the main aim of the surgeon, which is to heal at least all the upper part of the incision, if possible, by the first intention. I have no doubt, there are many, who would be advocates for sutures. In this country, the last method of operating has also been tried.

Mr. Wood, of Manchester, performed the Cæsarean operation, in a case, in which parturition was prevented by deformity of the pelvis. The incision was made nearly in a transverse direction, on the left side of the abdomen, about five inches in length, beginning at the umbilicus. This part was fixed upon, because the nates of the child could be felt there, and it was evident, that no intestine was interposed betwixt the abdominal parietes and the uterus. There was scarcely any effusion of blood, either from the external wound, or from that of the uterus, though the latter was made directly upon the placenta. Instead of dividing the placenta, Mr. Wood introduced his hand betwixt it and the uterus, and, laying hold of one of the child's knees, extracted the fœtus with ease. His hand passed with ease, betwixt the placenta and uterus; this produced a hemorrhage, but, not in any considerable degree; for, the whole quantity of blood lost did not exceed seven, or eight ounces. After the uterus was emptied, the intestines and omentum protruded at the wound. These having been reduced, the integuments

were brought into contact with sutures and adhesive plaster. This operation, however, did not save the woman's life; she died on the fourth day from the time of its being done. (See *Medical and Physical Journal, Vol.* 6.)

OF OPERATING, WHEN THE FŒTUS IS EXTRA-UTERINE.

Delivery cannot possibly happen in the ordinary way, when the fœtus is situated in the ovaries, or Fallopian tube, or in the cavity of the peritoneum. However, there are many instances recorded of ventral pregnancies, which the mothers have survived, the dead putrified fœtus having been discharged, either out of an abscess, or through the rectum.

Practitioners are occasionally called upon to do a very similar operation to the Cæsarean, when the child has passed into the cavity of the peritoneum, in consequence of the rupture of the uterus. Unfortunately, such an accident is not uncommon, and though the causes of it may not be obvious, nothing is more certain, than that the fœtus itself is entirely passive, and has no share in producing the misfortune. The symptoms, by which the event can be known, are not always easy of comprehension. When, however, the pains have been violent; when the last, after being excessively severe, has been followed by a kind of calm; when the countenance loses its colour, the pulse grows weak, and the extremities become cold and covered with a cold sweat; when the abdomen is generally flattened, and is only partially affected with a swelling, which is known to be occasioned by the fœtus, which either continues to move, or is dead and motionless; when the patient complains of a moderate degree of heat about the belly; and, lastly, when the child shrinks from the touch of the accoucheur; it is manifest that the uterus is lacerated. If the child has passed completely into the abdomen, gastrotomy is the only resource. Should a part of it, however, yet remain in the uterus, it may be extracted, with the aid of the forceps, if the head presents, or by the feet, provided only the upper part of the body be in the abdomen.

Baudeloque quotes three instances of gastrotomy, performed on account of the rupture of the uterus. The first is that inserted by Thibaud Dubois in the Journal de Médecine for May, 1760. Every preparation was made for a natural labour, when, after excessively violent pains about the upper and left part of the uterus, the child disappeared. Thibaud opened the abdomen, though not till some hours after the accident. The infant was dead; but, the mother experienced no ill effects after the operation, except such as are usual after ordinary labours.

The second and third cases were communicated to the French Academy of Surgery in 1775, by Lambron, a surgeon of Orleans. He practised the operation twice, on the same woman, with success. In the first instance, he operated eighteen hours after the rupture of the uterus. The child was dead. An ill-conditioned abscess formed near the wound; but, the patient got quite well in the course of six weeks. She was pregnant again the following year, and the uterus was once more ruptured. Lambron now had recourse to the operation without delay. The child betrayed some signs of life; but, soon died. The mother not only survived; but, afterwards became pregnant again, and had a favourable delivery.

A laceration in the uterus, or the wound, made in this viscus in the Cæsarean operation, may give rise to dangerous and even fatal symptoms of strangulation, if any of the intestines insinuate themselves into the preternatural opening. When such an occurrence happens in the performance of the preceding operation, the intestine must be directly withdrawn and replaced. If the accident were to happen, when the child is extracted the natural way, the bowel is to be pushed back into the abdomen from the uterus. Were the occurrence to take place several days after the operation, Sabatier enquires, what ought to be done? A surgeon is said to have pushed back the intestine from the uterus as late as the third day. Sabatier thinks, that later it could not be done. In this circumstance, Baudeloque advises the operation, suggested by Pigrai, namely, that of opening the abdomen and withdrawing the bowel from the place, in which it is incarcerated. But, there are serious objections to this proceeding. There is no certainty that the intestine is strangulated, and, if it were so, the adhesions, which are soon formed, would frustrate the operator in his design.

Gastrotomy has not only been recommended for cases, where the child has passed into the abdomen through a rupture of the uterus; it has likewise been advised for instances, in which the fœtus has grown in the Fallopian tube, ovary, or cavity of the abdomen. Here, indeed, the operation deserves to be called Cæsarean; for, in addition to the incision of the skin and muscles of the abdomen, it is necessary to open the pouch, in which the child is contained. The instances of conceptions in the Fallopian tube are not uncommon. Those in the ovary, and cavity of the peritoneum, are more rare. Sabatier conjectures, that most of the cases, reported to be of the latter kind, if attentively examined, would have been

found to be in reality conceptions in the Fallopian tube.

Extra-uterine conceptions hardly ever arrive at maturity. However, the fœtus, formed in the Fallopian tube, has sometimes been known to attain the term of nine months, and then die, either from the impossibility of its expulsion, or from the insufficiency of the nourishment afforded it. The pouch, in which it was contained, and the neighbouring parts, have then inflamed, and, after becoming connected together by numerous adhesions, have suppurated. The abscess has burst, partly at some point of the circumference of the belly, and, partly, into the rectum; and the dead fœtus has been discharged piece-meal with the matter.

In other examples, the fœtus, instead of giving rise to abscesses, has become ossified, with the envelloping membranes, and continued in this state many years, without any other inconvenience to the patient, than what depended on the size and weight of the tumour within the abdomen.

Most frequently, however, the pouch, containing the fœtus, bursts, about the middle of the ordinary period of gestation, and the child passes into the cavity of the peritoneum. At the same moment, the blood-vessels, ramifying on the parietes of the containing parts, usually pour forth into the abdomen so much blood, that the patients generally die in the space of a few hours.

Sabatier acquaints us, that two facts of this kind have fallen under his observation. The women were in the end of the fourth month of pregnancy. Excepting a swelling, which affected only one side of the abdomen, and frequent dragging pains in this cavity, there was no indication of any thing extraordinary. In other respects, the patients were well. They were both, all on a sudden, attacked with extremely acute pains, which lasted two or three hours. A more violent suffering, than the rest, was followed by entire ease. The abdomen subsided, and became as it were flat. An equal moderate warmth diffused itself over this part of the body. The skin lost its colour. Almost continual syncopes occurred. The pulse was feeble and concentrated. The whole body was covered with a cold sweat, and the women died. The rapid course of these symptoms rendered it impossible for Sabatier to be of any assistance. The patients were actually dying, when he was called to them. The examination of their bodies evinced, that the abdomen contained a large quantity of blood; that the children lay on the intestines, connected with the lacerated Fallopian tube by means of the umbilical cord; and that the tube itself, which was strongly contracted, presented no other tumour, except that which depended on the afterbirth.

There is nothing, that announces an extra-uterine pregnancy, with sufficient certainty, to justify any positive conclusion, respecting the nature of the case, before the ordinary time of parturition. In many women, the gravid uterus inclines to one side, and numerous pregnant females have dragging pains, which may depend upon other causes. Things, however, are different, when the fœtus has lived to the ordinary period of parturition, and the woman is attacked with labour-pains; because, besides the unequivocal signs of the presence of a child in the abdomen, the womb is empty, and is little changed from its common state. Should we now, asks M. Sabatier, have recourse to the Cæsarean operation, just as if the fœtus were in the womb? Can we be sure, that the pouch, which contains the child, will contract itself, like the uterus, and that the incision, which is in contemplation, will not give rise to a fatal hemorrhage? Would it be easy to separate, and remove the whole of the placenta? How could the discharge, analogous to the lochia, find an outlet, and would not, its extravasation in the abdomen, be likely to prove fatal? Sabatier thinks, that the risk, which is to be encountered, is much less, when things are left to nature. The child, indeed, must inevitably perish. It will either give rise to abscesses, with which it will be discharged in fragments, or it will remain for a length of time in the abdomen, without any urgent symptoms. Sabatier also calls our attention to the great precariousness of an infant's life, and expresses his opinion, that, there can be no difficulty in deciding what conduct ought to be adopted. Happily, practitioners are not often placed in circumstances so delicate, and extra-uterine conceptions mostly perish, before the end of the common period of gestation. We have then only to second the efforts of nature; either by promoting suppuration, if it should seem likely to occur; by making a suitable opening, or enlarging one that may have formed spontaneously; by extracting such fragments of the fœtus as present themselves; by breaking the bones, when their large size confines them in the abscess, as M. Littre did in an instance, where the abscess burst into the rectum; and, lastly, by employing suitable injections. (See *Sabatier's Médecine Opératoire*, *Tom.* I.)

Govei, p. 401, relates a case of ventral conception, in which instance the Cæsarean operation was done, and the child preserved. A lady, aged 21, had a tumour in the groin, which, was at first supposed to be an epiplocele, but an ar-

terial pulsation was perceptible in it. In about ten weeks, the swelling had become as large as a pound of bread. Govei, solicited by the lady, opened the tumour. He first discovered a sort of membranous sac, whence issued a gallon of a limpid fluid. The sac was dilated, and a male fœtus found, about half a foot long, and large in proportion. It was perfectly alive, and was baptized. After tying the umbilical cord, the placenta was found to be attached to the parts just behind, and near, the abdominal ring; but it was easily separated. Govei does not mention whether the mother survived; but the thing would not be very astonishing, considering the situation of the fœtus. Bertrandi says, he was unacquainted with any other example of the Cæsarean operation being done, in cases of extra-uterine fœtuses, so as to save both the mother and infant. This eminent man condemned operating, in ventral cases, on the ground that the placenta could not be separated from the viscera, to which it might adhere, or, if left behind, it could not be detached, without such inflammation and suppuration, as would be mortal. But if, in addition to such objections, says Bertrandi, the operation has been proposed by many, and practised by none, we may conclude that this depends on the difficulty of judging of such pregnancies, and of the time when the operation should be attempted. He puts out of the question the dilatations, which have been indicated for extracting dead portions of the fœtus, and also Govei's case, who operated without expecting to meet with a fœtus at all. (*Bertrandi Traité des Opérations de Chirurgie, Chap.* 5.)

Whenever the Cæsarean operation, or gastrotomy, has been performed, the practitioner is not merely to endeavour to prevent inflammation, heal the wound, and appease any untoward symptoms, which may arise; he should also prevail upon the mother to suckle the child, in order that the lochia may not be too copious, and, after the wound is healed, she should be advised to wear a bandage, for the purpose of hindering the formation of a ventral hernia, of which, according to surgical writers, there is a considerable risk.

The best sources of information are, *Sabatier's Médecine Opératoire, Tom.* 1. *Recherches sur l'Operation Césarienne par M. Simon, in Mém. de l'Acad. Royale de Chirurgie, Tom.* 3, *p.* 210, &c. *and Tom.* 5, *p.* 317, &c. *Edit. in* 12*mo. Bertrandi Traité des Opérations de Chirurgie, Chap.* 5. *Baudelocque's Traité des Accouchemens. Denman's Introduction to Midwifery. Hull's Defence of the Cæsarean Operation. Haighton's Enquiry concerning the true and spurious Cæsarean Operation. Edinb. Med. and Surgical Journal, Vol.* 4, *p.* 178, *Vol.* 8, *p.* 11. *Richerand's Nosographie Chirurgicale, Tom.* 4, *p.* 381, &c. *Edit.* 2. *Richter's Anfangsgrunde der Wundarzneykunst, Band* 7, *Kap.* 5; *Göttingen*, 1804.

CALCULUS. (from *calx*, a limestone.) Any stony, or earthy concretion, formed in various parts of the body, is usually so called, as, for instance, calculi in the ducts of the salivary glands, in cases of ranula; calculi in the kidnies, bladder, urethra, gall-bladder, &c. Many of these last concretions, if we were to judge by their chemical composition, seem to ill deserve the name of calculi, or stones. For an account of, what are commonly called, stones in the bladder, refer to *Urinary Calculi*.

CALCULUS IN THE INTERIOR OF THE EYE. See *Eye, &c.*

CALIGO CORNEÆ. See *Albugo, Cornea Opacities of, Leucoma, Staphyloma, &c.*

CALLOSITY. (from *callus*, q. v.) Preternatural hardness.

CALLUS. (from *calx*, the heel, or *calco*, to tread.) This term used to be applied to the thick skin, at the bottom of the heel, hardened by pressure. In surgery, the meaning of the word *callus* is *new bone*, or the solid substance, which serves to join together the ends of a fractured bone.

The old surgeons believed callus to be a mere inorganic concrete, a fluid poured out from the extremities of the ruptured vessels, which was soon hardened into bone. They always described it, as an "exudation of the bony juice," and imagined that it oozed from the ends of broken bones, as gum from trees, sometimes too profusely, sometimes too sparingly. The reunion of broken bones, and the hardening of callus, they compared with the glueing together of two pieces of wood, or the soldering of a broken pot. (*A. Paré.*) The old surgeons also conceived, that callus sometimes flowed into the joints, so as to form a clumsy, prominent protuberance. They imagined, that callus was a juice, which congealed at a particular period of time, and they therefore had fixed days for undoing the bandages of each particular fracture. They supposed, that its exuberance might be suppressed by a firm and well rolled bandage, and its knobby deformities corrected by pillows and compresses; that it might be softened by frictions and oils, so as to allow the bone to be set anew. All their notions were mechanical; and their absurd doctrines have been the apology for all the contrivers of machines, from Hildanus down to Dr. Aitken and Mr. Gooch.—(*John Bell's Principles of Surgery, Vol.* 1.)

A bone is a well organized part of the living body; that matter, which keeps its earthy parts together, is of a gelatinous nature. The earthy matter, to which a

bone owes its firmness, is deposited in the interstices of the gluten, undergoing a continual change and renovation. It is incessantly taken up by the absorbents, and secreted again by the arteries. It is this continual absorption and deposition of earthy matter, which forms the bone at first, and enables it to grow with the growth of the body. It is this unceasing activity of the vessels of a bone, which enables it to renew itself, when it is broken or diseased. In short, it is by various forms of one secreting process, that bone is formed at first, is supported during health, and is renewed on all necessary occasions. Bone is a secretion, originally deposited by the arteries of the bone, which arteries are continually employed in renewing it. Callus is not a concrete juice, deposited merely for filling up the interstices betwixt fractured bones, but it is a regeneration of new and perfect bone, furnished with arteries, veins, and absorbents, by which its earthy matter is continually changed, like that of the contiguous bone. Indeed, there could be no connexion, between the original bone and callus, were the latter only the inorganic concrete, which it was formerly supposed to be.

Notwithstanding the more accurate opinions now entertained, concerning callus, the supposition is still very common, that the slightest motion will destroy a callus, which is about to form. But, continues Mr. John Bell, it is an ignorant fear, proceeding merely from the state of the parts not having been observed; for, when callus forms, the perfect constitution of the bone is restored; the arteries pour out from each end of a broken bone a gelatinous matter; the vessels, by which that gluten is secreted, expand and multiply in it, till they form, betwixt the broken ends, a well organized, and animated mass, ready to begin anew the secretion of bone. Thus, the ends of the bone, when the bony secretion commences, are nearly in the same condition, as soft parts which have recently adhered; and it is only when there is a want of continuity in the vessels, or when a want of energetic action incapacitates them from renewing their secretion, that callus is imperfectly formed. This is the reason, why in scorbutic constitutions, in patients infected with syphilis, in pregnancy, in fever, or in any great disorder of the system, or while the wound of a compound fracture is open, no callus is generated. (*John Bell's Principles of Surgery, Vol.* 1, *p.* 500, 501.)

For some time, the secretion of earthy matter is imperfect; the young bone is soft, flexible, and of an organization suited for all the purposes of bone; but, as yet, delicate and unconfirmed; not a mere concrete, like a crystallization of a salt, which, if interrupted in the moment of forming, will never form; not liable to be discomposed by a slight accident, nor to be entirely destroyed by being even roughly moved, or shaken. Incipient callus is soft, fleshy, and yielding; it is ligamentous in its consistence, so that it is not very easily injured; and, in its organization, it is so perfect, that when it is hurt, or the bony secretion interrupted, the breach soon heals, just as soft parts adhere, and thus the callus becomes again entire, and the process is immediately renewed.

In consequence of the above circumstances, if a limb is broken a second time, when the first fracture is nearly cured, the bone unites more easily, than after the first accident; and when broken a third, and a fourth time, the union is still quicker. In these cases, the limb yields, it bends under the weight of the body, which it cannot support; but, without any snapping or splintering of the bone, and, generally, without any overshooting of the ends of the bone, and without any crepitation.

Callus is found to be more vascular, than the old bone. Mr. John Bell mentions an instance of a bone, which had been broken twelve years, before he injected it, yet the callus was rendered very singularly red. When a recently formed callus is broken, many of its vessels are ruptured, but some are only elongated, and it rarely happens, that its whole substance is torn. It is easy to conceive, how readily the continuity of the vessels will be renewed in a broken callus, when we reflect on its great vascularity; and the vigorous circulation, excited by the accident, in vessels already accustomed to the secretion of bone. These reasons shew, why a broken, or bent callus, is more speedily united, than a fractured bone. (Observations, connected with the subject of *Callus*, will be found in the article *Fracture*.)

CALOMEL. (Submuriate of mercury; hydrargyri submurias, L. P.) Its extensive utility, in numerous surgical diseases, will be conspicuous in an immense proportion of the articles in this work. When prescribed, as an alterative, it is commonly directed in the dose of a grain or two a day; when ordered as a purgative, from three to ten grains are given; and when directed, with a view of exciting a salivation, from two to four or five grains a day may be exhibited conjoined with opium. Calomel, generally speaking, is not an eligible preparation for curing venereal complaints; because, when the doses exceed a certain quantity, they generally affect the bowels.

CALVATA. Blunt, smooth surgical

instruments, such as a probe with a button at the end of it.

CALX CUM KALI PURO. This is the strong kind of caustic, most commonly employed in surgery. It is chiefly used for making the eschars, when issues are to be formed. This is often necessary in cases of diseased vertebræ, white swellings, morbid hip-joints, &c. (See *Vertebræ*.) This caustic is also sometimes used, though not so often as it was formerly, for opening buboes and other abscesses. Some are in the habit of making it into a paste with soft soap; they cover the part affected with adhesive plaster, in which there is a hole of the size of the eschar intended to be made; and into this aperture they press the paste till it touches the skin. A bandage is then applied to secure the caustic substance in its situation, till the intended effect is produced.

The action of the calx cum kali puro, in this way, however, is more inert and tedious, and, perhaps, on this account, more painful upon the whole. Hence, many of the best modern surgeons never adopt this method; but, after covering the surrounding parts with sticking plaster, rub the caustic on the situation, where it is desirable to produce an eschar, till the skin turns brown. The end of the caustic must first be a little moistened.

The calx cum kali puro, is commonly employed also for destroying large funguses.

Before the port-wine injection was found to be the best radical cure for the hydrocele, this caustic was mostly used in this instance. (See *Hydrocele*.). Mr. Else, in the case alluded to, used to mix the caustic with powdered opium, by which, it is said, though not with much appearance of truth, that the sloughs were made with little, or no pain to the patient.

Some assert that the kali purum alone, acts more quickly, than when mixed with quicklime. I have not found this to be the fact, and, after trying both, give the preference to the calx cum kali puro.

CALYPTER. A fleshy excrescence in the situation of the hemorrhoidal veins. A pile.

CAMARO'MA, CAMARO'SIS, or CAMERA'TIO. A fracture, resembling an arch, particularly, in the skull.

CAMBU'CA. A bubo. An abscess about the pudenda. Also, a boil.

CAMOMILE. *Chamæmelum*. The flowers are bitter and aromatic, and are employed in surgery in fomentations.

CAMPHOR, is used externally, chiefly as a means of exciting the action of the absorbents, and thus dispersing many kinds of swellings, extravasations, indurations, &c. Hence, it is a very common ingredient in liniments. It has also the property of rousing the action of the nerves, and quickening the circulation in parts, on which it is rubbed. For this reason, in paralytic affections, it is sometimes employed.

Perhaps, there is no composition, that has greater power in exciting the absorption of any tumour, or hardness, than camphorated mercurial ointment.

Camphor is often given internally, in delirium, depending on the irritation of local surgical diseases, as we shall have occasion to explain in several parts of this work. It is also a remedy frequently administered in cases of mortification. Some have recommended it, as singularly useful for the relief of stranguries, even those depending on the operation of cantharides. But, although it may occasionally have succeeded, when given with this view, it not only does not always do so, but, it has been known to cause, an opposite effect, sometimes producing great scalding in voiding the urine, and sometimes pains like those of labour. (*Medical Transactions, Vol.* 1, *p.* 470.)

CA'MPULUM. A distortion of the eyelid.

CAMPYLO'TIS. A distortion of the eyelid.

CANCER. (derived from the Latin *cancer*, a crab, to which, a part, affected with cancer, and surrounded with varicose veins, was anciently thought to have some resemblance.) Also called *Carcinoma*.

Practitioners distinguish cancer into two kinds, viz. *occult* and *ulcerated*, or *open*. No definition can be offered, which is applicable to both, though each of these terms implies the same disease, only in a different stage.

By *occult cancer* is meant a hard, scirrhous tumour, for the most part accompanied with pains, which are lancinating, excessively acute, and recur with more or less frequency. At length, the tumour breaking, is converted into cancer, strictly so called, or the disease in a state of ulceration.

The occult cancer is also sometimes termed *scirrhus*, on account of its peculiar hardness.

The female breast, and the uterus, are particularly subject to the disease. The breasts of men are but rarely affected. The testes, lips, (especially the lower one of male subjects), the penis, the lachrymal gland and eye, the tongue, the skin, (particularly that of the face), the tonsils, the pylorus, the bladder, rectum, prostate, and a variety of other parts, are recorded by surgical writers as having frequently been the seat of scirrhus and cancer. They seem, however, to have comprehended an immense number of different

malignant diseases under one common name, and, in many of the cases called cancerous, there are no vestiges of the true scirrhous structure.

OF SCIRRHUS, OR CANCER, NOT IN THE ULCERATED STATE.

Mr. Abernethy has given a matchless history of this affection, as it appears in the female breast, where it most frequently occurs, and can be best investigated. Sometimes, says this valuable writer, it condenses the surrounding substance, so as to acquire a capsule; and then it appears, like many sarcomatous tumours, to be a part of new formation. In other cases, the mammary gland seems to be the nidus for the diseased action. The boundaries of the disease cannot be accurately ascertained in the latter case, as the carcinomatous structure, having no distinguishable investment, is confined with the rest of the gland. In either instance, carcinoma begins at a small spot, and extends from thence in all directions, like rays from a centre. This is one feature distinguishing this disease from many others, which, at their first attack, involve a considerable portion, if not the whole, of the part, in which they occur. The progress of carcinoma is more or less quick in different instances. When slow, it is in general unremitting. Mr. Abernethy thinks, that though the disease may be checked, it cannot be made to recede by the treatment, which lessens other swellings. He is not, however, positive on this point; for, surgeons have informed him, that diseases which eventually proved to be carcinomatous, have been considerably diminished by local treatment. With great deference to Mr. Abernethy, we may be allowed to remark in this place, that every tumour, which ends in cancer, is not from the first of this nature, though it has in the end become so; consequently, it may at first yield to local applications, but will not do so, after the cancerous action has commenced. Hence, Mr. Abernethy's opinion, that a true carcinomatous tumour cannot be partially dispersed, at least, remains unweakened by the fact, that some tumours have at first been lessened by remedies, though they have at last ended in cancer. Mr. Home's observations fully prove, what indeed every surgeon has long known, that any sort of tumour may ultimately become cancerous.

Without risk of inaccuracy, we may set down the backwardness of a scirrhous swelling to be dispersed, or diminished, as one of its most confirmed features. This obdurate and destructive disease excites the contiguous parts, whatever their nature may be, to enter into the same diseased action. The skin, the cellular substance, the muscles, and the periosteum, all become affected, if they are in the vicinity of cancer. This very striking circumstance distinguishes carcinoma, says Mr. Abernethy, from several other diseases. In what this author calls *medullary sarcoma*, the disease is propagated along the absorbing system; but the parts immediately in contact with the enlarged glands do not assume the same diseased actions. Neither in the *tuberculated* species does the ulceration spread along the skin, but destroys that part only covering the diseased glands. Mr. Abernethy acquaints us, that Mr. Hunter took notice, that a disposition to cancer exists in the surrounding parts, before the actual occurrence of the diseased action. Hence arose the following rule in practice: *That a surgeon ought not to be contented with removing merely the indurated, or actually diseased part, but that he should also take away some portion of the surrounding substance, in which a diseased disposition may probably have been excited.* In consequence of this communication of disease to the contiguous parts, the skin soon becomes indurated, and attached to a carcinomatous tumour, which, in like manner, is fixed to the muscles, or other part, over which it was formed.

As a carcinomatous tumour increases, it generally, though not constantly, becomes unequal upon its surface, so that this inequality has been considered as characteristic of the disease. A lancinating pain is common; but it is not experienced in every case, without exception. It is also a symptom, attending other tumours, which are unlike carcinoma in structure, and it cannot, therefore, be deemed an infallible criterion of the nature of the disease. (*Abernethy.*)

A hard and painful glandular swelling, having a disposition to become cancer, says Richter, is the common, but, inadequate and erroneous definition of scirrhus. The disease is not regularly attended with swelling; sometimes scirrhous parts diminish in size, and shrink. Hardness is not a characteristic property; for, many tumours, which are not scirrhous, are exceedingly indurated. The disease is not always situated in a gland: it oftentimes attacks structures, which cannot be called glandular; and hard glandular swellings are often seen, which do not partake of scirrhus. The disposition to cancer cannot be enumerated among the marks of scirrhus, since it is not discoverable, till carcinoma has actually commenced. Its termination in open cancer, is not an invariable occurrence; and other tumours become cancerous, to which no one would apply the

term scirrhus. (*Anfangsgr. der Wundarzn. Band* I.)

Scientific surgeons ought undoubtedly to have a definite meaning, when they employ the word scirrhus; superficial practitioners do unquestionably use the word most vaguely; and, perhaps, influenced by its etymology, they call an immense number of various morbid indurations scirrhous.

I have always considered scirrhus, as a diseased hardness, in which there is a propensity to cancerous ulceration, and a greater backwardness to recede, than exists in any other kind of diseased hardness, although the skin may occasionally not break during life, and a few scirrhous indurations may have been lessened.

Though Richter states, that this disposition cannot be discovered, till carcinoma has actually taken place; though Messrs. Burns and Home confirm, that other indurations and tumours may terminate in cancer; though Mr. Abernethy shews, that sarcomatous, and encysted tumours may end in most malignant diseases, and such as merit the name of cancer; yet, it is now well ascertained, that in all these instances, the changes, which precede cancerous ulcération, bear no similitude to the genuine scirrhus.

The puckering of the skin, the dull leaden colour of the integuments, the knotted and uneven feel of the disease, the occasional darting pains in the part, its fixed attachment to the skin above, and muscles beneath, form so striking an assemblage of symptoms, that, when they are all present, there cannot be the smallest doubt, that the tumour is a scirrhus, and that the disease is about to acquire, if it have not already acquired, the power of contaminating the surrounding parts, and the lymphatic glands, to which the absorbents of the diseased part tend.

The truly scirrhous tumour, which is known to be capable of changing into the true open cancer, when allowed to increase in size is known to be hard, heavy, connected with the gland of the breast; and, when moved, the whole gland moves along with it. The structure of a scirrhous tumour in the breast, is different in the various stages of the disease; and a description of the appearances, exhibited in the three principal ones, may give a tolerable idea of what the changes are, which it goes through, previous to its breaking, or becoming, what is termed, an open cancer.

When a section is made of such a tumour, in an early stage, provided the structure can be seen to advantage, it puts on the following appearance: the centre is more compact, harder to the feel, and has a more uniform texture, than the rest of the tumour; and is nearly of the consistence of cartilage. This middle part does not exceed the size of a silver penny; and, from this, in every direction, like rays, are seen ligamentous bands, of a white colour, and very narrow; looking, in the section, like so many extremely irregular lines, passing to the circumference of the tumour, which is blended with the substance of the surrounding gland. In the interstices, between these bands, the substance is different, and becomes less compact towards the outer edge. On a more minute examination, transverse ligamentous bands, of a fainter appearance, form a kind of net-work, in the meshes of which the new-formed substance is inclosed. This structure accords with what Dr. Baillie describes to be the case, in cancerous diseases of the stomach and uterus. (*Home.*)

In a further advanced stage of the tumour, the whole of the diseased part has a more uniform structure; no central point can be distinguished; the external edge is more defined, and distinct from the surrounding gland; and the ligamentous bands, in different directions, are very apparent, but do not follow any course, that can be traced. (*Home.*)

When the tumour has advanced to what may be called cancerous suppuration, which, however, does not always happen in the centre, before it has approached the skin, and formed an external sore; it then exhibits an appearance totally different from what has been described. In the centre is a small irregular cavity, filled with a bloody fluid, the edges of which are ulcerated, jagged, and spongy. Beyond these, there is a radiated appearance of ligamentous bands, diverging towards the circumference; but, the tumour, near the circumference, is more compact, and is made up of distinct portions, each of which has a centre, surrounded by ligamentous bands, in concentric circles.

In some instances, the scirrhus has no appearance of suppuration, or ulceration, in the centre, but consists of a cyst, filled with a transparent fluid, and a fungous excrescence, projecting into this cavity, the lining of which is smooth and polished. When a large hydatid of this kind occurs, a number of very small ones have been found, in different parts of the same tumour; and, in other cases, there are many very small ones, of the size of pins' heads, without a large one. These hydatids are certainly, by no means, sufficiently frequent in their occurrence to admit of their forming any part of the character of a cancerous tumour. (*Home's Observations on Cancer.*)

In the fourth chapter of this work, the author relates two cases of hydatids found in the breast. In the first, the contents

of the cyst were bloody serum; in the second, a clear fluid. These two cases of simple hydatids in the breast, unconnected with any other diseased alteration of structure, led Mr. Home to consider the hydatids sometimes found in cancerous breasts: and, he believes, that such hydatids are no part of the poisonous disease, but accidental complaints superadded to it; and, since such hydatids do occur in the natural state of the glands, they are much more likely to do so in disease. (*Home.*)

Mr. Home endeavours to define his conception of a cancer, as follows: As cancer is a term, too indiscriminately applied to many local diseases for which we have no remedy, though they differ very much among themselves, it becomes necessary to state what the complaints are, which I include under this denomination. The present observations, respecting cancer, apply only to those diseased appearances, which are capable of contaminating other parts, either by direct communication, or through the medium of the absorbents; and when they approach the skin, produce in it small tumours of their own nature, by a mode of contamination, with which we are at present unacquainted.

There is a disease, by which parts of a glandular structure are very frequently attacked, particularly the os tincæ, the alæ of the nose, the lips, and the glans penis. This has been called cancer, but differs from the species, of which we are now treating, in not contaminating the neighbouring parts, with which it is in contact; and neither affecting the absorbent glands, nor the skin at a distance from it. It is, properly speaking, an eating sore, which is uniformly progressive; whereas, in cancer, after the sore has made some progress, a ridge is formed upon the margin, and the ulceration no longer takes that direction. It also differs from a cancer, in admitting of a cure, in many instances, and under different modes of treatment.

From the facts, which have been stated, (in Mr. Home's case) it appears, that cancer is a disease, which is local in its origin. In this respect, the cases (alluded to) only confirm an opinion very generally received.

Mr. Home endeavours to establish a second point, that cancer is not a disease, which immediately takes place in a healthy part of the body; but one, for the production of which it is necessary, that the part should have undergone some previous change, connected with the disease. In proof of this, Mr. Home adduces the two first cases in his work, and the innumerable instances, in which a pimple, small tumour, or wart upon the nose, cheek, or prepuce, after remaining for ten, fifteen, or thirty years, without producing the smallest inconvenience; but, at the age of sixty or seventy, upon being cut in shaving, bruised by any accidental violence, or otherwise injured, assumes a cancerous disposition.

All the cases of induration of the gland of the breast, or of indolent tumours in it, which have continued for years, without producing any symptom, and, after being irritated by accidental violence, have assumed a new disposition, and become cancerous, admit of the same explanation; and are adduced as so many proofs of the truth of this latter position. (*Home.*)

DISTINGUISHING CHARACTERS OF SCIRRHUS.

A scirrhous induration seldom acquires the magnitude, to which almost all other tumours are liable to grow, when no steps are taken to retard their growth. Many scirrhi are certainly attended even with a diminution, or shrunk state, of the part affected.

Scirrhi are generally more fixed, and less moveable, than other sorts of tumours; especially, when the latter have never been in a state of inflammation.

With the exception of the fungus hæmatoides, other diseases do not involve in their ravages indiscriminately every kind of structure, skin, muscle, cellular substance, &c. and the integuments seldom become affected, before the distention, produced by the size of such swellings, becomes very considerable. In scirrhous cases, the skin soon becomes contaminated, discoloured, and puckered.

Some few tumours may be harder, and heavier, than a few scirrhous ones; but, the reverse, is commonly the case.

As other indurations, and tumours, may assume the cancerous action, and even end in cancerous ulceration; and, as some true scirrhi, when not irritated by improper treatment, may continue stationary for years; the occurrence of actual carcinoma cannot prove, that the preceding state was that of scirrhus. The only criterion of the latter disease is deduced from the assemblage of characters already specified; for, except the peculiar puckering, and speedy leaden discolouration of the skin, no other appearances, considered separately, form any line of discrimination.

The white ligamentous bands, around a scirrhus, is a very characteristic symptom; but, these cannot be detected, till the disease has been removed. Hence, how manifestly prudent it must be to take away a considerable portion of the substance surrounding a scirrhous tumour! Were any of these white bands left, the disease would inevitably recur.

OF CANCER IN THE STATE OF ULCERATION.

The diseased skin, covering a carcinomatous tumour, generally ulcerates, before the tumour has attained any great magnitude; a large chasm is then produced in its substance, partly by a sloughing, and partly by an ulcerating process. Sometimes, when cells, contained in the tumour, are by this means laid open, their contents, which are a pulpy matter of different degrees of consistence, and various colours, fall out, and an excoriating ichor issues from their sides. This discharge takes place with a celerity, which would almost induce belief, that it can hardly result from the process of secretion. When the diseased actions have, as it were, exhausted themselves, an attempt at reparation appears to take place, similar to that which occurs in healthy parts. New flesh is formed, constituting a fungus of peculiar hardness, as it partakes of the diseased actions, by which it was produced. This diseased fungus occasionally even cicatrizes. But, though the actions of the disease are thus mitigated; though they may be for some time indolent and stationary; they never cease, nor does the part ever become healthy.

In the mean while, the disease extends through the medium of the absorbing vessels. Their glands become affected, at a considerable distance from the original tumour. The progress of carcinoma, in an absorbent gland, is the same as that, which has been already described. The disease is communicated from one gland to another, so that after all the axillary glands are affected, those, which lie under the collar bone, at the lower part of the neck, and upper part of the chest, become disordered. Occasionally, a gland, or two, become diseased higher up in the neck, and apparently out of the course which the absorbed fluids would take. As the disease continues, the absorbent glands, in the course of the internal mammary vessels, become affected. In the advanced stage of carcinoma, a number of small tumours, of similar structure to the original disease, form at some distance, so as to make a kind of irregular circle round it.

The strongest constitutions now sink under the pain and irritation, which the disease creates, aggravated by the obstruction, which it occasions to the function of absorption, in those parts, to which the vessels leading to the diseased glands belong. Towards the conclusion of the disease, the patient is generally affected with difficulty of breathing, and a cough. (*Abernethy.*)

The edges of a cancerous ulcer are hard, ragged, and unequal, very painful, and reversed in different ways, being sometimes turned upwards and backwards, and, on other occasions, inwards. The whole surface of the sore is commonly unequal: in some parts, there are considerable risings, whilst, in others, there are deep excavations. The discharge, for the most part, is a thin, dark coloured, fetid ichor; and is often possessed of such a degree of acrimony, as to excoriate, and even destroy, the neighbouring parts. In the more advanced stages of the disease, a good deal of blood is often lost from the ulcerated vessels. A burning heat is universally felt over the ulcerated surface; and, this is the most tormenting symptom, that attends the disorder. Those shooting, lancinating pains, which are generally very distressing in the occult state of the complaint, become now a great deal more so. Notwithstanding that cancerous diseases are not always situated in glandular parts, yet the situation of such sores affords some assistance in the diagnosis; for, six times as many cancerous affections occur in the lips, and female breasts, as in all the rest of the body together. (*B. Bell.*)

Concerning the peculiar state of the parts in cancer, or the proximate cause, many opinions have prevailed. Until lately, the melancholic humour was supposed to be the fluid, which was obstructed, and accumulated, in consequence of which it fermented, and produced a burning ulcer; and whatever promoted the generation of this humour, was currently admitted as a remote cause of cancer.

"Women," says Paré, "are more subject to scirrhus, than men; because their liver is warmer, and their spleen, being weaker, is less able to purge the blood of choler." Grief and chagrin, by promoting the formation of this fiery fluid, were accordingly considered by Heister as very apt to induce the "cancerous diathesis;" and he adds by way of corollary, "old maids, and women, who do not breed, are very subject to cancer in the breast." Some thought that the obstructed humour became charged with an acid, (*Dionis*) and that this produced ulceration. Others conjectured, that by an adustion, or over-concoction, it grew sharp and burning. Wiseman thought it more probable, that it might become arsenical. These changes were almost universally believed to depend upon the previous stagnation, in consequence of obstruction; and this leading point has uniformly been insisted upon by every preceding author, whatever may be his particular notion, with regard to the nature of the obstructed fluid, whether bile, blood, or lymph. Even Mr. B. Bell insists fully on the cause of cancer being a mechanical obstruction. Some have asserted, that they have detected little worms in the parts, which, eating them up, produced all the mischief attendant

on cancer; and that to their introduction the disease was owing. Others have ridiculously assigned a little wolf in the part, as the cause of the disease! Strange as this doctrine, of living creatures producing cancer, may appear, it is nevertheless adopted by Dr. Adams. (*Observations on Morbid Poisons.*) When hydatids find their way into a solid substance, the consequence, in his opinion, will be cancer; and the success of an operation will, he conjectures, depend, in a great measure, upon these animals being confined in a common cyst, for then they may be all removed; whereas, if they be unconnected, some of the smaller ones may be allowed to remain. From the surface of the cyst, which contains the animal, a fungus shoots out, and thus acts, as a barrier, between it and the skin; or, if the animal have been in the stomach, it separates it from the coats of that viscus, "preventing suppuration in the one instance, and absorption in the other." This suppuration, and "disposition to fungate, before the skin is broken," is, (continues Mr. Burns) if I understand him, produced by the death of the animal; for, says Dr. Adams, "if hydatids possess the principle of vitality, during their transparent state, and their opacity is the effect of the loss of that principle, would they not, in the latter stage, stimulate the part, in which they are situated, to suppuration, as we find the case with the guinea-worm, when dead?"

Concerning the manner, in which these animals produce the symptoms of cancer, we are told, that "this enlargement of a foreign body in a solid substance, and so extremely sensible, as the breast, cannot but be attended with intense pain, and frequent inflammation." A doctrine not far removed, says Mr. Burns, from that taught in the humoral schools, which maintained, that the coagulation, and inspissation of the fluids, distended the follicles of the glands, producing many cavities, and much pain. (See *Burns on Inflammation, Vol. II.*)

We have already stated, that, though hydatids are occasionally found in cancerous tumours, they are not found often enough to make any part of the character of the disease; and they are met with, in cases, in which there is not the least vestige of such disorder.

After cancer had continued some time, it was believed, that the matter was absorbed into the blood, and that all the humours were speedily assimilated. Hence, was explained the fatal and rapid progress of relapses, after an apparent cure. The only effect of absorption, however, is on the lymphatic glands, which intervene betwixt the sore and the heart; for, beyond these, the absorbed matter is changed in its nature and properties. (*Burns.*)

In many instances, cancer is evidently produced by the same causes, which are capable of producing simple inflammation. It is, however, a general opinion, that cancer arises frequently from some unknown and mysterious cause, which we cannot detect, and which, therefore, has been resolved into some constitutional taint, or cancerous ferment. But, so far as we know, the constitution is perfectly healthy, in the commencement of this disease; nor is there the smallest proof, that it resembles scrophula, in depending on any peculiarity of constitution, before the causes operate. Blows, bruises, &c. may give rise to cancer; but, in many instances, there is no evident local cause acting directly on the part. In the breast, cancer frequently commences, without the interference of any topical agent. There is always, however, in these cases, an irregularity, or disappearance of the menses; and the affection of the mamma seems to depend on sympathy between it and the uterus. Certain it is, that cancer is very frequent about the time of life, when the menstrual discharge ceases.

Cancerous diseases are undoubtedly most common in elderly persons; but, no age is exempted from this disease. Mr. Burns mentions his having seen it distinctly marked, and attended with a fatal event, in children of five years old: he mentions two instances of the eye being affected in such subjects, though from the late observations of Mr. Wardrop, we may now reasonably suspect, that these examples were really cases of the fungus hæmatodes.

TREATMENT OF CANCER.

Some have supposed cancers to be a general disorder of the system; while others have regarded them merely as a local affection. This is a point of much importance in practice; for, if cancers are originally only local affections, no objection can be made to extirpating them. They who think, that cancer is a constitutional disease, regard the operation as useless, perhaps hurtful, inasmuch as it may convert a scirrhus into an open cancer, or make the affection occur in some other part.

The best practitioners of the present day, however, have rejected the doctrine of cancer depending on constitutional causes; and, we have stated Mr. Home's sentiments, in opposition to the opinion. When cancer breaks out again, in the same part, after the performance of an operation, it is often owing to some portion of the disease having been blameably left behind, or to the operation having been

put off too long. How likely it is, that some of the cancerous mischief may be left unremoved by the operator, is obvious, on considering the manner, in which the white bands, resembling ligament, shoot into the surrounding fat; and that, even the fibres of the muscles, beneath a cancerous disease, are frequently affected. At the same time, it must be allowed, that the disease is sometimes, to all appearances, so freely and completely removed, that its recurrence must perhaps be imputed to the continued operation of the same unknown cause, which originally produced the first cancerous mischief.

Until very lately, the accounts given of the results of operations for cancers, were so unpromising, that they must have deterred many patients from undergoing a timely operation; which, for cancerous complaints, is the only remedy to be depended on, with which we are as yet acquainted. As Mr. B. Bell remarks, the great authority of Dr. Alexander Monro must have had no inconsiderable influence even with practitioners, in making them much more backward in undertaking the extirpation of cancers, than they otherwise would probably have been. "Of near sixty cancers," says he, "which I have been present at the extirpation of, only four patients remained free of the disease, at the end of two years: three of these lucky people had occult cancers in the breast, and the fourth had an ulcerated cancer on the lip." (*Edinb. Med. Essays, Vol.* 5.) Dr. Monro also observes, that, in those, in whom he saw the disease relapse, it was always more violent, and made a quicker progress, than it commonly did in others, on whom no operation had been performed. Hence, he questions, "whether ought cancerous tumours to be extirpated, or ought the palliative method only to be followed?" and, upon the whole, he concludes against their extirpation, except in such as are of the occult kind, in young healthy people, and that have been occasioned by bruises, or some other external causes.

More modern experience, however, has afforded a very different result, and given ample encouragement to the early performance of an operation, and even to making an attempt to cut away the disease, in every instance, both of the occult, and ulcerated kind, when such a measure can be so executed, as not to leave a particle of the cancerous mischief behind.

Mr. Hill, in 1772, published some valuable remarks on the present subject. At this period, he had extirpated from different parts of the body eighty-eight genuine cancers, which were all ulcerated, except four; and all the patients, except two, recovered of the operation. Of the first forty-five cases, only one proved unsuccessful; in three more, the cancer broke out again in different parts; and, in a fifth, there were threatenings of some tumours, at a distance from the original disease. These tumours, however, did not appear, till three years after the operation; and the woman was carried off by a fever, before they had made any progress. All the rest of the forty-five continued well, as long as they lived; or are so, says Mr. Hill, at this day. One of them survived the operation above thirty years; and, fifteen were then alive, although the last of them was cured in March 1761.

Of the next thirty-three, one lived only four months; and, in five more, the cancer broke out afresh, after having been once healed. The reason, why, out of forty-five cases, only four or five proved unsuccessful, and six, out of thirty-three, was as follows: "The extraordinary success, I met with, (says Mr. Hill,) made cancerous patients resort to me from all corners of the country, several of whom, after delaying till there was little probability of a cure by extirpation, or any other means, forced me to perform the operation, contrary both to my judgment and inclination."

Upon a survey in April 1764, made with a view to publication, the numbers stood thus: Total cured, of different ages from eighty downwards, sixty-three; of whom there were then living thirty-nine. In twenty-eight of that number, the operation had been performed more than two years before; and, in eleven, it had been done in the course of the last two years. So that, upon the whole, after thirty years' practice, thirty-nine, of sixty-three patients, were alive and sound; which gives Mr. Hill occasion to observe, that the different patients lived as long after the extirpation of the cancers, as according to the bills of mortality, they would have done, had they never had any cancers, or undergone any operation.

The remaining twenty-five, which complete the eighty-eight, were cured since the year 1764. Twenty-two of these had been cured, at least, two years; and some of them, it may be remarked, were seventy, and one ninety years old.

In the year 1770, the sum of the whole stood thus: Of eighty-eight cancers, extirpated at least two years before; not cured, two; broke out afresh, nine; threatened with a relapse, one; in all, twelve, which is less than a seventh part of the whole number. At that time, there were about forty patients alive and sound, whose cancers had been extirpated above two years before.

Mr. B. Bell, who was present at many of these cases, bears witness to Mr. Hill's

accuracy; and, the former very judiciously states, that, "from these and many other authenticated facts, which, if necessary, might be adduced of the success, attending the extirpation of cancers, there is, it is presumed, very great reason, for considering the disease, in general, as a local complaint, not originally connected with any disorder of the system; and that a general cancerous taint seldom, or perhaps never, occurs, but, in consequence of the cancerous virus being absorbed into the constitution from some local affection. This, in every case of real cancer, or rather in such scirrhosities, as, from their nature, are known generally to terminate in cancer, should certainly determine us to have recourse to extirpation as early as possible; and, if this were done soon after the appearance of such affections, or before the formation of matter takes place, their return would probably be a very rare occurrence." (*System of Surgery, Vol.* 7.)

MEDICINES AND PLANS, WHICH HAVE BEEN TRIED, FOR THE CURE OF SCIRRHUS AND CANCER.

It is a contested point, whether a truly cancerous disease is susceptible of any process, by which a spontaneous cure can be effected. It appears certain, however, that a violent inflammation, ending in sloughing, may sometimes accomplish an entire separation of a cancerous affection, and that the sore, left behind, may then heal. Facts, confirming this observation, are occasionally exemplified in cases, where caustic is used, and accidental inflammations have led to the same fortunate result, as we may be convinced of by examples recorded by Home, Richerand, &c. The latter writer, adverting to the effort, which nature sometimes makes to rid herself of the disease, on the inflammation and bursting of the tumour, takes the opportunity to relate the following case. A woman, aged forty-eight, of a strong constitution, was admitted into the hospital of St. Louis, with a cancerous tumour of the right breast. The swelling, after becoming softer, and affected with lancinating pains, was attacked with an inflammation, which extended to the skin of the part, and all the adjacent cellular membrane. The whole of the swelling mortified, and was detached. A large sore, of healthy appearance, remained after this loss of substance, and healed in two months. (*Nosographie Chirurgicale, Tom.* 1, *p.* 381, *Edit.* 2.)

In general, however, it must be confessed, that inflammation, attacking a cancerous disease, renders things worse instead of better, and by converting occult cancers into ulcerated ones, hastens the patient's death, or, at all events, renders his cure more difficult, and forbids any attempts, which, on such a principle, might be made for his relief.

Of the general remedies, narcotics, such as cicuta, opium, nightshade, &c. have been employed with most confidence.

Cicuta owed its reputation to the experimenting talent of Storck, who has written several libelli on this plant. According to him, cicuta possesses very evident powers over cancer, and has cured a great many cases; but, in less prejudiced hands, it has been found much less successful; and even in many of the instances, adduced by Baron Storck, of its utility, it is by no means proved, that the disease was really cancer. The public have now with great reason, very little reliance on this medicine. In cancerous ulceration, Mr. Burns declares, that he never knew cicuta produce even the temporary melioration, which many talk of.

The common way of exhibiting the hemlock is to begin with small doses, and increase them gradually, until they produce vertigo. We may begin with two grains of the extract, or four of the powder, recently prepared, twice, or thrice a day, and the quantity is to be gradually increased. In this way, some patients have at last been able to take an ounce of the extract daily; but, says Mr. Burns, if a much less quantity, than this, produce no good effect, we may consider it as useless to continue a remedy, which, in this dose, must injure the constitution every day that it is continued. On the continent, hemlock has been used in the form of a bath; but, it is so disagreeable, that few will submit to this method.

The belladonna has been much recommended by Lambergen. During its use, he kept the bowels open with clysters, administered every second day. The dose should be, at first, a grain of the dried leaves, made into a pill. This, in the beginning, is to be given in the morning and evening, and afterwards more frequently. The reputation of belladonna has not been supported by much success.

The hyocyamus has often been tried in cancerous cases, and was held in great estimation by the ancients. Mr. Burns says, he has employed it occasionally, but with little effect. The dose, with which you may begin, is two grains of the extract.

The aconitum has also been given; and, as it is a very powerful and dangerous narcotic, a quarter of a grain of the extract is generally the dose, at first. The solanum dulcamara, Paris quadrifolia, phytolacca, &c. have been recommended; but, they are now hardly ever employed; which is a sufficient proof of their ineffi-

cacy. Mr. Burns mentions his having tried the hepatized ammonia, without any benefit. Richter has given the laurus cerasus, but with little success. The dose of the distilled water being uncertain, four, or five grains of the fresh leaves may be infused in a little water, as a dose.

The digitalis diminishes vascular action, and may act on scirrhi, like abstinence, bleeding, &c. It has, however, no specific virtue in curing cancerous diseases.

Opium is seldom employed, with an intention of curing cancer, although it probably has just as much power of this kind, as other narcotics, which have been more frequently used. For the purpose of lessening the pain of cancerous diseases, however, opium is very freely employed.

Tonics may sometimes improve the general health; but, as they never produce any effect on the local disease, they are now seldom exhibited.

Mr. Justamond thought arsenic a specific for cancers. Future experience has not, however, altogether confirmed the truth of this opinion, though there are many practitioners, who continue to think highly of the efficacy of this mineral in carcinomatous diseases. Indeed, I am of opinion, that arsenic has greater claims to further trials in these cases, than perhaps any other medicine, that has hitherto been employed. It unquestionably cures numerous ill-looking sores, on the face, lips, and tongue, and is one of the best remedies for noli me tangere. Mr. Hill observes: "Experience has furnished me with some substantial reasons for considering arsenic as a medicine of considerable merit, both with regard to actual cancer and scirrhus, which may one day terminate in that horrible species of ulcer; and although I cannot as yet say it will remove the one, or cure the other, as certainly and safely as mercury commonly does a syphilitic swelling, or open sore, yet, it will, in a great majority of cases, retard the progress of the true scirrhous tumour, and often prevent its becoming cancer. In some, it has appeared to dissipate such swellings completely." (See *Edinb. Med. and Surgical Journal, Vol.* 6, *p.* 58.)

Mercury, in conjunction with decoctions of guaiacum, sarsaparilla, &c. has been recommended; but, as Mr. Burns very justly remarks, no fact is more certainly ascertained, than that mercury always exasperates the disease, especially, when in the ulcerated state.

The cuprum vitriolatum has been tried; but, it has at this day no fame whatever. The same may be said of muriated barytes.

The carbonate (rust) of iron has been extolled, by Mr. Carmichael, for its efficacy in curing cancer. Besides the carbonate of iron, he has prescribed the tartrate of iron and potass, and the phosphate, oxyphosphate, and suboxyphosphate of the metal. Some constitutions can bear these preparations only in small quantities; they affect most patients with constipation, and many with headach and dyspnea. These circumstances, therefore, must be attended to in regulating the dose. The above gentleman has seldom given less than thirty grains, in divided doses, in a day, or exceeded sixty. He prefers the suboxyphosphate for internal use, and states, that it answers best in small doses, frequently repeated. It should be blended with white of egg, have a little pure fixed alkali added, and then be made into pills with powdered liquorice. Aloes is recommended for the removal of costiveness. When half a grain is combined with a pill, containing four grains of carbonate of iron, and taken thrice a day, the constipation will be obviated. When the internal use of iron brings on headach, difficult respiration, a quick, sometimes full pulse, which is also generally, hard and wiry, excessive languor, lassitude, &c. and such symptoms become alarming, the iron is to be left off, and four grains of camphor given, every fifth hour.

At the same time, that preparations of iron were internally administered, Mr. Carmichael has employed externally, for ulcerated cancers, the carbonate, phosphate, oxyphosphate, and arseniate of iron, blended with water, to the consistence of a thin paste, which was applied once every twenty-four hours. To occult cancers, the same gentleman has applied a solution of the sulphate of iron, ℥j to lbj of water. The acetite of iron, diluted with eight or ten times its weight of water, was also used. These lotions were put on the part affected by means of folded linen, wet in them, and covered with a piece of oiled silk to prevent injury of the clothes. (See An *Essay on the effects of the Carbonate and other preparations of iron upon Cancer, &c. by Richard Carmichael.*)

Many remedies have acquired celebrity in cases of cancer, because very bad and malignant diseases, only supposed to be cancers, have got well, under their use. Such is probably the case with the carbonate of iron.

In some instances, Mr. Justamond used to join the corrosive sublimate with arsenic. Opium, added to both applications, mitigates the pain, without injuring the efficacy of the remedy.

The only mode of treatment, which Mr. Pearson has ever seen do any particular benefit to cancer, is that of keeping the

patient on a diet, barely sufficient for the support of life, such as barley-water, alone, tea, &c. Patients, with cancers, receive considerable benefit from being kept strictly on a milk diet.

The old surgeons commonly dressed cancerous sores, with narcotic applications. Vesalius used cloths, dipped in the juice of the solanum; whilst others employed it mixed with oil of roses, and preparations of lead, and antimony. Others had recourse to the hyocyamus; but, of late, the cicuta poultices seem to have superseded most other narcotic applications. These have undoubtedly, in many cases, as Mr. Burns observes, abated the pain, and diminished the fetor; but, this is all which can reasonably be expected; and even this expectation will not always be realized.

Carrot poultices are better, than those of hemlock, as they produce as much ease, and diminish the fetor more powerfully.

The fetor of cancers having been thought to resemble that of the kali sulphuratum (liver of sulphur) and the oxygenated muriatic acid being the best agent for decomposing, and destroying such smell, it has been recommended, as an application to cancerous sores. It may correct the fetor; but, it will never accomplish a cure.

Carbonic acid has been said not only to correct the fetor, but, in some instances, completely to cure the disease. It was long ago proposed, says Mr. Burns, by M. Peyrille, and, of late, it has again been brought forward by Dr. Ewart. Experience, however, has not shewn, that the efficacy of carbonic acid, in cases of cancer, is very great. Fourcroy remarks: "After the first applications, the cancerous sore appears to assume a more favourable aspect; the sanies, which flowed from it, becomes whiter, thicker, and purer, and the fleshha sa redder and fresher colour; but, these flattering appearances are deceitful, nor do they continue long, for the sore speedily returns to its former state, and its progress goes on, as before the application." The best method of applying carbonic acid is, by means of a bladder, the mouth of which is fastened round the sore, with adhesive plaster. The air is introduced by a pipe, inserted at the other end.

Sometimes, the fermenting poultice is employed.

Digitalis, as a local application, is entitled to about as much confidence as ci-
ut

Tar ointment, gastric juice, absorbent powders, &c. have been tried; but, without any evident good. (See *Burns on Inflammation, Vol. 2.*)

Mr. Fearon rejects, probably with much reason, all internal remedies, as inefficient in the treatment of cancer; and, he recommends, in the early stages of the complaint, a method of practice founded on his idea of the inflammatory nature of the disease. "In the beginning of scirrhous affections of the breast and testis, the mode I have adopted of taking away blood, is by leeches repeatedly applied to the parts. In this course, however, I have often been interrupted by the topical inflammation, produced by these animals, around the parts where they fastened. In delicate female habits, I have often lost a week, before I could proceed to the re-application of them. When the symptoms lead me to suspect the stomach, uterus, or any of the viscera, to be so affected, that the complaint either is, or, most probably, soon will become cancerous, I then have recourse to general bleedings. But, whether topical, or general, perseverance for a sufficient length of time, is necessary. Though the pulse never indicated such practice, yet the patients have not suffered by repeated bleedings; on the contrary, when they passed a certain time without losing blood, they felt a return of their symptoms, and, of their own accord, desired to be bled again. To this plan of repeated bleedings, I joined a milk and vegetable diet, avoiding wine, spirits, and fermented liquors." Mr. Fearon used also to keep the belly open, and employ saturnine applications.

From the preceding accounts, we may infer, that scarcely any reliance is to be placed on any known remedy, or plan, in cases of real scirrhi, and ulcerated cancers. The operation is the only rational means of getting rid of the disease; and, to waste time, so as to allow the disorder to increase in a serious degree, merely for the sake of trying a train of unpromising medicines, is a conduct, which is unworthy of a wise surgeon's imitation.

Perhaps, in early cases, it may be right to make trial of arsenic, cicuta, or preparations of iron. But, the practitioner should beware of devoting too much time to medicines, which will in all probability prove inadequate to the object, for which they are exhibited. Mr. Fearon's method seems also warrantable, together with diet merely enough to support life; but the punishment, attending a resignation to this last regimen, would be greater, than that of having the disease cut away, while the chance of efficacy would be much less. Upon the whole, therefore, the operation is what we should generally resort to, as the surest, and the safest means of getting rid of cancerous diseases. As I have before remarked, the operation is always admissible, when every particle of the disease can be removed by it. Even large open cancers,

if they can be entirely cut away, are often capable of being effectually cured.

The removal of cancerous disorders even in the slightest and most trivial cases, should be always effected with the scalpel, in preference to caustic; the use of which, though formerly recommended by some authors, and still adhered to by some, (*Young*) ought, for very obvious reasons, to be entirely laid aside. The irritation generally occasioned by every application of the caustic kind, together with the pain and inflammation, which commonly ensue, are strong objections in cancerous cases. Plunket's remedy, which is chiefly arsenic, is equally objectionable. Nor can you, at once, so certainly extirpate every atom of cancerous mischief with any caustic, as you can with the knife: for, with this, you immediately gain an ocular inspection of the surface surrounding the disease, so as to see and feel whether the disordered parts are completely removed, or whether any portion of the disorder requires a further employment of the instrument. With respect to the pain, that of caustics is infinitely greater, more intolerable, and more tedious, than that occasioned by the knife. When caustic also fails in destroying every particle of the disease at once, it almost always tends to enlarge, in a very rapid way, the original boundaries of the mischief. For an account of the method of removing scirrhi and ulcerated cancers, see *Mamma, Removal of.*

For information on cancer, the reader is particularly referred to *Le Dran's Operations in Surgery*, p. 287, &c. *Edit.* 2. *B. Bell's Surgery, Vol.* 2. *Justamond on Cancers. Hill's Cases in Surgery. Pearson on Cancerous Complaints. Abernethy's Surgical Observations*, 1804. *Fearon on Cancers. B. Bell on Ulcers. Home on Cancer. Adams on Cancerous Breasts, and on Morbid Poisons. Medical Museum, Vol.* 1. *London Medical Transactions, Vol.* 1. *Goock's Med. Observations, Vol.* 3. *L'Encylopédie Méthodique, Partie Chirurgicale. Article Cancer, in London Medical Dictionary, and Rees's Cyclopædia. Practical Observations on Cancer, by the late John Howard. Mémoire Renforment quelques Vues Générales sur le Cancer, in Œuvres Chirurgicale de Desault par Bichat, Tom.* 3, p. 406, &c. *Richerand's Nosographie Chirurgicale, Tom.* 1, p. 377, &c. *Edit.* 2. *Lambe's Reports of the Effects of a peculiar Regimen in Cancerous Complaints. Baillie's Morbid Anatomy of some of the most important Parts of the Human Body. The Queries of the Society for Investigating the Nature and Cure of Cancer may be seen in the Edinb. Med. and Surgical Journal, Vol.* 2, p. 382, &c. *Consult also Wardrop on Fungus Hæmatodes, in which may be seen an interesting comparative view of this last affection and cancer. Denman's Observations on the Cure of Cancer, and on Carmichael's Essay on Cancer, Edit.* 2.

CANCER SCROTI. CHIMNEY-SWEEPER'S CANCER. (See *Scrotum.*)

CANCRENA. (See *Gangrene.*)

CA'NCRUM ORIS. A deep, foul, irregular, fetid ulcer, with jagged edges, which appears upon the inside of the lips and cheeks, and is attended with a copious flow of offensive saliva. According to Mr. Pearson, this disease is seldom seen in adults; but, most commonly, in children from the age of eighteen months to that of six, or seven years. The gums, as well as the lips and cheeks, are sometimes affected, in which circumstance, the teeth are generally carious and loose. The ulceration is occasionally attended with abscesses, which burst either through the cheek, lip, or just below the jaw. Exfoliations are not unfrequent, and, when the disease is neglected, extensive sloughing sometimes happen.

Living in a marshy situation; unwholesome food; and inattention to cleanliness; are suspected of being conducive to this disorder. The causes of the affliction seem not to be much understood; but, it is remarked, that the disease prevails most in houses, where children are crowded together. It is uncertain, whether the complaint is contagious.

Though children are the usual subjects of this disease, grown-up persons sometimes do not escape its attacks.

The treatment recommended consists, in extracting diseased teeth and loose pieces of bone; directing a milk vegetable diet, with a prudent quantity of fermented liquors; and prescribing bark, sarsaparilla, and elm bark, with mineral acid.

The best external applications are said to be such as diluted mineral acids; burnt alum; the decoctum cinchonæ, with the zincum vitriolatum; tincture of myrrh; lime water, with spirit of wine, &c. (See *Pearson's Principles of Surgery, Edit.* 2. *p.* 287.)

We cannot conceive it a safe and prudent method to use any preparation of copper, as an application to the ulcer. However, such practice has an advocate in the preceding author.

CANKER OF THE MOUTH. (See *Cancrum Oris.*)

CANNULA. Any kind of small tube, employed for surgical purposes.

CANTHA'RIDES. (*Lytta.*) Spanish, or French flies, with which the common blistering plaster is made. In surgery, they are also prescribed in incontinence of urine, gleets, &c. The tincture is sometimes used as a liniment for stimulating parts.

CAPELINA. (from *capeline*, a woman's

hat, or bandage, French.) *A reflex bandage.* It is a double-headed roller, about twenty-four feet long, and four inches broad; sometimes narrower. The middle is applied to the occiput, and, after two or three circular rounds, the rollers intersect each other upon the forehead and occiput; then one roller being reflected over the vertex to the forehead, the other is continued in a circular track. They next cross each other upon the forehead, after which the first head is carried back obliquely towards the occiput, and reflected by the side of the other.

The last is continued in a circular direction; but the first is brought again over the sagittal suture, backward and forward, and so continued, till the whole head is covered.

This bandage used to be applied in cases of hydrocephalus; it has no advantage, however, and is now hardly ever used.

CAPILLARY FISSURE. A very minute crack in the skull. The term came into use from the resemblance of such a fracture to a hair.

CAPILLA'TIO. A capillary fissure.

CAPILLITIUM. The disorder of the eyelids, or eyelashes, better known by the appellations of distichiasis, and trichiasis.

CAPISTRATIO. A phimosis, or such a contraction of the orifice of the prepuce, as prevents the patient from uncovering the glans penis.

CAPISTRUM. (καπιστρον, from *caput*, the head; as being made to guide and govern the head.) A surgical bandage, somewhat resembling a bridle or headstall. (See *Bandage.*)

CAPULUM. A distortion of the eyelid.

CARBO. See *Carbuncle.*

CARBUNCLE. (from *carbo*, a burning coal.) *Anthrax.* This is a very common symptom in the plague; but comes on also sometimes as a primary disease. The first symptoms are great heat and violent pain in some part of the body, on which arises a kind of pimple, attended with great itching; below which a circumscribed, but very deep-seated, and extremely hard tumour may be felt with the fingers. This tumour soon assumes a dark red, or purple colour, about the centre, but is considerably paler about the edges. A little blister frequently appears on the apex, which, as it occasions an intolerable itching, is often scratched by the patient. The blister being thus broken, a brown sanies is discharged, and an eschar makes its appearance. Many such pimples are sometimes produced upon one tumour, in consequence of the patient's scratching the part.—(*Bromfield's Observ. Vol.* I.)

Carbuncles have been distinguished into the *benign* and *malignant* kinds; but, these distinctions appear to be scarcely warrantable, or, at best, they are only founded upon the different degrees of violence, with which the disease makes its attacks. Some carbuncles are said to be *pestilential*, while others are not so. Fortunately, all the cases, which are met with in this country, are of the last sort; for, no opportunities of remarking the pestilential anthrax have occurred in England since the deplorable periods of 1665, and 1666.

The carbuncle sometimes appears in persons affected with putrid fevers, in which case, it is attended with great weight and stiffness of the adjacent parts; the patient is restless and pale, the tongue white, or of a deep red, and moist; the pulse low, urine sometimes pale, sometimes very turbid, with all the other symptoms, in an exaggerated degree, which attend typhoid fevers. The patient often complains much of his head, either from pain, or giddiness. Sometimes, he is drowsy; at other times, he cannot get the least sleep. Occasionally, he is delirious. The case is also apt to be attended with chilliness, or rigors, and profuse perspirations. The patient is sometimes costive, sometimes afflicted with a profusion of stools; he generally complains of loss of appetite, nausea, and vomiting, takes but little nourishment, complains of difficulty of breathing, and is extremely low, with palpitations of the heart, and sometimes faintings. (See *Bromfield's Observations, Vol.* I. *p.* 122.)

Sometimes a little slough, of a black colour, appears in the middle of the tumour. This was supposed by the ancients to be a part of the body burnt to a cinder, or hard crust, by the violence of the disease. The carbuncle is considered by some as a sort of gangrenous affection of the cellular substance. (*Latta.*) The progress of carbuncles to the gangrenous state is generally quick. Their size is very various; they have been known to be as large as a plate. Considerable local pain and induration always attend the disease. The skin, indeed, has a peculiar feel, like that of brawn. As the complaint advances, several apertures generally form in the tumour. Through these openings, there is discharged a greenish, bloody, fetid, irritating matter. The internal sloughing is often very extensive, even when no sign of mortification can be outwardly discovered.

If attention is paid to the skin in this case, we shall frequently find some miliary eruptions about the clavicles, the breasts, or other parts of the body; and, towards the latter end of the disorder, a different collection of large pimples will

sometimes be thrown out, like the small-pox, and suppurate. Some of these, indeed, are occasionally converted into actual carbuncles. It was this species of anthrax, which was called *malignant*, and, certainly, if any cases, seen in this country, demand this epithet more strongly, than others, it is the instance, the description of which we have just quitted.

The constitution is often so low and exhausted, that death follows. The carbuncle, indeed, is most frequent in old persons, whose constitutions have been injured by voluptuous living, and, hence, we cannot be surprised, that the local disease, influenced by the general disorder of the system, should assume a dangerous aspect.

The degree of peril may generally be estimated by the magnitude and situation of the tumour, the number of such swellings at the same time, the age of the patient, and the state of his constitution.

The duty of a surgeon, in cases of anthrax, may be described in a very few words. With regard to the local treatment of a carbuncle, the grand thing is to make an early and free incision into the tumour, so as to allow the sloughs and matter to escape readily. As much of the contents as possible is to be at once pressed out, and then the part is to be covered with an emollient poultice. Indeed, until the tumour is opened, no applications are more proper than emollient poultices, and, when an incision has been made, they are far preferable to any detersive antiseptic injections, made with bark, tincture of myrrh, &c. or to any lotions made with the sulphates of copper, and zinc, nitrate of silver, &c. fomentations will also be found to afford considerable relief, both before and after an opening has been made. As the discharge is exceedingly fetid and irritating, it will be necessary to put on a fresh poultice two or three times a-day. The use of the poultice is to be continued, till all the sloughs have separated, and the surface of the cavity appears red, and in a granulating state, when soft lint and a pledget of some unirritating ointment should be applied, together with a tow compress and a bandage. The dreadful manner, in which the disease is protracted, by not making a proper opening in due time, cannot be too strongly impressed upon the mind of every practitioner, and it may justly be regarded as a frequent reason of the fatal terminations of numerous cases. Mr. Bromfield forcibly inculcates this necessity of making, at a proper time, an opening sufficient to draw out the sloughs; for, says he, in case you rely on that opening, which is generally made by nature, the thin matter only will be discharged, and the sloughy membranes will remain, and the orifice close up. (See *Vol.* 1, *p.* 128.)

It was formerly not an uncommon custom to extirpate carbuncles with the knife, or to destroy them with the actual and potential cauteries. The French were very fond of burning the swelling with a hot iron, the employment of which is sanctioned by Pouteau. (See his *Œuvres Posthumes*). These methods, having been found cruelly painful, and, in no respect advantageous, have long been branded with the reproaches of all English surgeons. With respect to the constitutional treatment, we should remember, that the disease is for the most part met with in bad constitutions, and in persons who are weak and irritable. Hence, it is only when there is a full strong pulse, and the complaint is just beginning, that bleeding is allowable. Bark and camphor are the internal medicines most commonly needed. The vitriolic acid is also very proper, as well as wine and aromatics. As the pain is very severe, opium is generally an essential remedy. The constitutional treatment is very analagous to that of mortifications, and, for this reason, I do not deem it necessary to enlarge the present article, by expatiating on this part of the subject. (See *Mortification.*)

In many of the southern parts of Europe, a malignant species of carbuncle, appears to be endemic, contagious, and very often fatal. For an account of this form of the disease, I would particularly advise the reader to consult *Richerand's Nosographie Chirurgicale, Tom.* 1, *p.* 125, *&c. Edit.* 2, *and Larrey's Mémoires de Chirurgie Militaire, Tom.* 1, *p.* 104, *&c. Bromfield's Chirurgical Cases and Observations. L'Encyclopédie Méthodique, Partie Chirurg. art. Anthrax. Pearson's Principles. Richter's Anfangr. der Wundarzn. Band* 1.)

CARCINOMA. (from καρκινος, a crab.) See *Cancer.*

CARIES. (from καιρω, to abrade.) The clearest way, in which we can convey an idea of caries, is, by comparing it with ulceration of the soft parts, in which we know a breach is produced by the action of the absorbents. All the bones are liable to caries; but the spongy ones are more frequently attacked, than such as are compact. Hence, the vertebræ, astragalus, and other bones of the tarsus, those of the carpus, the sternum, and the extremities of long bones, are the most common situation of this affection. The bones of young persons are said to be more frequently carious, than those of old subjects.

Many authors have confounded caries with necrosis, which they have called dry caries. Others have considered it to be the same as exostosis. The carious part

of a bone becomes so soft, that the end of a blunt probe may be easily forced into its substance. The openings, with which the bone is perforated, are filled with fungous flesh, which bleeds from the slightest cause. A dark-coloured serum is discharged, which always has a disagreeable smell, but becomes particularly fetid, when exposed to the air.

In necrosis, the bone is entirely deprived of the vital principle; in caries, this principle exists, and there is a morbid action going on, which destroys the texture of the bone.

Some of the causes of caries are internal, others external. The former are the most frequent; a contusion, or external violence, being more apt to produce necrosis than caries.

Abscesses are said to produce, occasionally, a caries of the bones, over which they take place. For this reason, it has been laid down, as a rule, to open such abscesses at an early period, in order to prevent the disorder of the bone. If some abscesses, however, as for instance, those which form over the anterior surface of the tibia, and mastoid process of the temporal bone, be frequently attended with caries, the latter is the cause and not the consequence of the suppuration. Pus, which is a bland, unctuous, inodorous fluid, never attacks the soft parts, with which it is in contact, until its qualities are changed by exposure to the air. When an abscess forms in the anterior part of the parietes of the abdomen, the peritoneum of that part, naturally a thin membrane, instead of being corroded, becomes thick, and strong enough to resist the effusion of pus into the cavity of the abdomen. The periosteum becomes thickened in similar circumstances, when the abscess is a consequence of an external injury.

Scrophula invades the spongy structure of the bones and the lymphatic system. A caries from this cause is very common in the tarsus, carpus, elbow, and knee; but it is always preceded by a white-swelling.

The venereal disease is sometimes a cause of caries, though its action on the bones generally occasions necrosis, or exostosis. However, when it attacks the bones of the nose it renders them carious, by which they are consumed, and the face sadly disfigured. The bones of the palate are sometimes destroyed in the same manner, and by the same cause.

In cancers of the mammæ, the sides of the sternum are sometimes found carious.

A superficial caries in easily detected. When the affected bone is deeply situated, the disease may be ascertained by introducing a probe, which will readily pass into the substance of the bone. But, bones not easy of access, may become carious, in which cases, the diagnosis is not so obvious. However, if a fistula, from which a fetid blackish matter flows, run forwards to a bone, and the adjacent soft parts be swollen, and indurated, there is reason to suspect the existence of caries.

Caries, occasioned by syphilis, affects most commonly the tibia, os frontis, ossa nasi, ossa palati, and sternum.

A caries of the vertebræ is known by peculiar symptoms, among which a paralysis of the inferior extremities, and lumbar abscesses, are the most remarkable.

A caries of the spongy parts of bones is much more difficult to cure, than a similar affection of their compact parts. Caries of the carpal and tarsal bones is particularly obstinate. These bones being in close contact, the affection cannot easily be prevented from spreading from one to the other. Amputation is often the only means of cure. The same is frequently the case, when the spongy heads of the long bones become carious. Even this mode of relief is not practicable when the head of the bone lies very deeply, like that of the os femoris.

Caries, resulting from scrophulous, or cancerous mischief, is more difficult of cure, than when it arises from venereal or scorbutic causes; for, some efficacious remedies against the latter are known; but cancer and scrophula resist all the remedies hitherto discovered. The prognosis is less favourable in old, than young subjects, and much depends on the extent of the disease, the patient's strength, and the state of the soft parts.

To form a just idea of the treatment of caries, we should consider, that a bone, thus affected, is a prey to a morbid action of its own parts, and that this action creeps from one part to another, and pervades the whole with greater or less rapidity, if art should not interfere, and assist nature in arresting its progress.

When the caries arises from constitutional disease, this should be resisted with suitable remedies.

Thus mercurial and sudorific medicines put a stop to caries arising from the venereal disease. Spirituous drinks, vegetable diet, and acids, cure both the scurvy, and the caries dependent on it.

But, when caries is altogether a local affection, the separation of the diseased parts may be promoted by absorbent powders, and stimulant applications. Lint, dipped in the tincture of aloes or myrrh, has often been put on such diseased bones. If these remedies be found ineffectual, a pledget of lint, dipped in a solution of the argentum nitratum, may be employed.

On the continent, and particularly in

France, they still adhere to the plan of touching carious parts of bones with the actual cautery, after bringing them fairly into view by a previous use of the knife. It is thought, that the burning iron acts by changing the caries into a necrosis, irritating the subjacent sound parts, and exciting that action of the vessels, by which the dead or diseased part of the bones must be thrown off. (See *Boyer on Diseases of the Bones, Vol.* 1.)

Issues seem to be most effectual in checking the caries attendant on white-swellings and diseased vertebræ. (See *Joints and Vertebræ.*)

Mr. Hey has succeeded in cutting away a carious part of the tibia. He began the operation by dissecting off the granulations of flesh, which had arisen from the bone, and then sawed out, by means of a circular headed saw, a wedge of the tibia, two inches in length. The removal of this portion brought into view a caries of the cancelli, almost as extensive as the piece already removed. With different trephines, suited to the breadth of the caries, Mr. Hey removed the diseased cancelli of the bone, quite through to the opposite lamella. As the caries extended in various directions, it was not possible to remove the whole of it with a trephine, without removing also a large portion of the sound part of the bone, which Mr. Hey wished to avoid. By the assistance, therefore, of a strong sharp-pointed knife, he pursued the caries in every direction, until every part was taken away, which had an unsound appearance. The wound was simply dressed with dry lint; the whole surface was speedily covered with good granulations, and a complete cure was obtained, without any exfoliation.

Mr. Hey concludes this subject, as follows: "I have treated some other cases of caries of the tibia in the same manner, and with equal success. Where the extent of the caries is not so great as to prevent a complete removal of the morbid part, this method is extremely useful, and far superior to the use of the potential or actual cautery.

"The trephine is not wanted, where the cancelli of the bone are not affected with the caries. The diseased parts of the lamella may be removed with gouges or small chissels. Granulations of flesh will then arise from the sound parts of the bone, and become united with the inguments, which ought to be preserved as far as is possible."

The two cases, which Mr. Hey has related, are exactly of that kind, to which several writers apply the term *spina ventosa.* (See *Practical Observations in Surgery.*)

CARO ADNATA. An old appellation for the sarcocele.

CAROTID ARTERY, ANEURISM OF. (See *Aneurism.*)

CARTILAGES IN JOINTS. (See *Joints.*)

CARUNCLE. (dim. of *caro*, flesh.) *Caruncula.* A small excrescence, which has the appearance of flesh.

CASTRATION. *Castratio.* (from *castro*, to castrate.) The operation of removing a testicle. For an account of the cases rendering this necessary, see *Testicle, Diseases of.* The manner of operating is as follows: The patient being laid on a table of convenient height, the integuments covering the spermatic vessels in the groin, are to be divided. This incision should begin as nearly as can be, opposite to the opening in the abdominal muscle, and should be continued a good way down the scrotum.

The manner of beginning this incision is differently described by writers; some of them advising that the skin be held up by an assistant; others that the knife be used perpendicularly in this as in other parts. The latter mode is preferred by English surgeons in general. The length of the division is a more important consideration. A small wound will indeed serve to lay bare the spermatic chord; but it will not permit the operator to do what is necessary afterwards with dexterity, or facility; and as the scrotum must, first or last, be divided nearly to the bottom, it had better be done at first. The spermatic chord, thus laid bare, is to be freed from its surrounding membranous connexions; and then the operator, with his finger and thumb, separating the blood vessels from the vas deferens, must pass a ligature between them, and having tied the former only, must cut through the whole chord, at a quarter or half an inch distance from the said ligature, according as the state of the process and testicle will admit. This done; he is then, with the same knife, with which he has performed the former part of the operation, to dissect the testicle out from its connexion with the scrotum: the loose texture of the connecting cellular substance, the previous separation of the testicle from the spermatic chord, and the help of an assistant to hold up the lips of the wound, will enable him to do this with very little pain to the patient, and great facility to himself. If any considerable artery bleeds in the scrotum, it is to be tied. (*Pott.*)

Mr. S. Sharp once castrated a man, whose testicle weighed above three pounds, and some of the vessels were so exceedingly varicous and dilated, as nearly to equal the size of the humeral

artery. (*Operations of Surgery, chap.* 10.)

Desault first divides the chord, and, holding its upper end between the index finger and thumb of his left hand, he then takes up the arteries with a pair of forceps, which are immediately tied by an assistant. (*Desault par Bichat, Tom.* 2.)

Pott used to fill the cavity of the wound with lint; but Desault, and all the modern surgeons of this country, bring the edges of the wound together, and endeavour to heal as much of it as possible by the first intention. Some, with this view, use sutures and sticking-plaster; others, only the latter, aided with compresses and a T bandage; which means, in my humble opinion, are quite enough.

The operation of the compresses and bandages cannot be too carefully attended to, as it is the surest means of preventing hemorrhage from any small arteries in the scrotum, while it conduces to the union of the parts. Care must be taken, however, not to let the pressure hurt the sound testicle.

It is somewhat extraordinary, that M. Larrey should condemn the plan of uniting the wound, though, indeed, we cannot be surprised at his delivering this advice, when we recollect, that he disapproves of healing the stump, after amputation, by the first intention. The passage, relative to dressing the wound after castration, seems to be a contrast to the sensible observations which generally prevail in this author's publication: "*Il ne faut pas, réunir les bords de la plaie, comme l'ont conseillé quelques praticiens, parce qu'ils doivent suppurer, et que la suppuration est nécessaire!* (*Mem. de Chirurgie, Militaire, Tom.* 3. *p.* 426.)

Sometimes, one or more vessels begin to bleed soon after the patient is in bed, although they effused no blood just after the removal of the testicle. Keeping the dressings and scrotum continually wet with the cold saturnine lotion very often, suffices for the suppression of such hemorrhage: if not, the wound must be opened again, and the vessels tied.

M. J. L. Petit has made some useful remarks on this operation. The vessels of the scrotum, says he, are not the only ones, which may be the source of hemorrhage. Anatomists know, that the septum, which divides this part into two cavities, is furnished with an artery, that is not considerable, but, which becomes materially enlarged, in the case of a sarcocele, or other tumour. It is sometimes so considerable, that it causes a bleeding, which makes a surgeon, who has had no previous opportunity of seeing the occurrence, exceedingly uneasy. Such hemorrhage, adds M. Petit, may be easily suppressed with a ligature; and, he assures us, that he has seen a surgeon dress the patient three times, without ever suspecting, that the bleeding, for which the applications were a third time removed, proceeded from this artery. (*Petit Traité des Maladies Chirurgicales, Tom.* 2, *p.* 524—525.)

The same experienced and able surgeon also acquaints us, that he has more than once extricated from trouble persons, who knew not how to stop the bleeding after the operation. He has seen some of them take off the dressings several times, without discovering the wounded vessel. As they imagined, that the only hemorrhage, that could follow castration, must be from the spermatic artery, they contented themselves with examining the ligature on the cord, and increasing the compression, in order to stop the bleeding; but, finding their attempts fail, they were compelled to seek assistance. On being sent for, M. Petit found, that the blood did not issue from the cord, but from a small artery, under the skin, at the inferior angle of the wound. He easily stopped the hemorrhage, and explained, not only, that the cord had no share in the accident, but, that it is generally suspected without foundation. Indeed, says he, the least constriction will stop the bleeding from the spermatic artery; it is not essential to tie it;—"I myself am content with cutting the cord, so as to leave it rather longer than usual, and apply no ligature; I press it against the os pubis, near the ring of the external oblique; I lay over it a linen compress, half as thick as the finger, two inches in length, sufficiently broad to cover the part, and yet narrow enough to be placed entirely within the wound. Over this compress, I put dossils of lint; I fill the scrotum with plain lint, and then cover the whole with compresses, observing to put one, which is thicker, than the rest, above the pubes, immediately over that, which I have laid upon the cord, so that the bandage may make moderate pressure on this last part, yet sufficient to prevent bleeding." (*Op. cit. p.* 526—527.)

This quotation is not made with a view of inducing any modern operator to imitate the preceding practice, which, indeed, the advantages of the present mode of dressing the wound entirely forbid, as well as the greater security of the ligature; but, the passage is cited, for the express purpose of impressing on the mind of the young surgeon, that, in general there is more risk of bleeding from the vessels of the scrotum, than those of the cord, after the removal of a diseased testis. I have never seen hemorrhage from the spermatic artery give trouble after the operation, but, have often known sur-

geons obliged to take off the dressings on account of bleeding in the scrotum.

In every operation, in which a considerable portion of skin is to be divided, and particularly in this, and in the amputation of women's breasts, it should always be remembered, that, as the division of the skin (the general organ of sensation) is the most acute and painful part of what is done by the knife, it cannot be done too quickly, and should always be done at once: the scrotum should always be divided to the bottom, and the circular incision in the skin of a breast always made quite round, before any thing else be thought of. If this be not executed properly, and perfectly, the operation will be attended with a great deal of pain which might be avoided, and the operator will be justly blameable. (*Pott.*)

When the diseased testicle is exceedingly large, or a part of the scrotum is diseased, the surgeon should take care to remove the redundant, or morbid portion of the skin, by including the piece, which he designs to take away, within two long elliptical incisions, which are to meet at the upper and lower part of the swelling. In this manner, as Mr. Samuel Sharp has observed, the hemorrhage will be much less, the operation greatly shortened, the sloughing of the distended skin prevented, and the recurrence of cancerous disease rendered less likely. (See *Treatise of the Operations, chap.* 10.)

If the tumour be of a pyriform figure, perfectly smooth, and equal in its surface, and free from pain, notwithstanding the degree of hardness may be great, and the surgeon may, in his own opinion, be clear that the tumour is not produced by water, but is a true scirrhus, let him, immediately previous to the operation, pierce the anterior part with a trocar, in order to be certain. "My reason for giving this advice is, that I was once so deceived by every apparent circumstance of a true, equal, indolent scirrhus, that I removed a testicle, which proved upon examination to be so little diseased, that, had I pierced it with a trocar previous to the operation, I could and certainly should have preserved it. (*Pott.*)

It is well known, that the agony of tying the chord is immensely increased by including the vas deferens, and, as no good results from so doing, the practice deserves the severest reprobation, notwithstanding the opposite opinion of Pearson, and the writer of the article *Castration* in Rees's Cyclopædia.

Cases are even recorded, in which the inclusion of the whole of the spermatic cord appears to have occasioned severe and perilous consequences, and these in so great a degree, that it has been found necessary to cut and remove the ligature. Sometimes, says M. J. L. Petit, patients, on whom castration has been performed, suffer more or less acute pain in the kidnies. The suffering often becomes insupportable and highly dangerous, the belly being swelled, tense, and painful; the patient being affected with syncopes, and affections of the heart, sometimes with vomiting, and a retention of urine, lastly, an universal inflammation of the belly, and a violent fever, accompanied with delirium, are occasionally the fatal consequences of this operation. Petit was required to visit a patient, who had been in this deplorable state for twenty-four hours, after having suffered castration, and this distinguished surgeon could impute the sudden and violent symptoms to nothing, except the ligature on the spermatic cord; consequently, he advised, the ligature to be removed. The patient received some slight relief from this step, and, after having been bled twice within a short space of time, he found himself a great deal better; but, as the dressings became wet with blood, apprehension of bleeding began to be entertained. Petit, therefore, had recourse to moderate compression of the cord, in the manner above related. No hemorrhage ensued; the case afterwards went on well; and the patient recovered sooner than was expected. (*Traité des Maladies Chirurgicales, Tom.* 2, *p.* 527, 528.)

In the operation of removing a testicle, one caution seems particularly necessary, viz. if the cord should be at all enlarged, the surgeon ought carefully to examine, whether the augmentation of its size may not be owing to a portion of intestine, or omentum, that is contained within it. (See *Sabatier's Médecine Opératoire, Tom.* 1, *p.* 332, *Edit.* 1.) In one case of extirpation of the testicle, "after the operation was completed, and the wound dressed, the patient being seized with a fit of coughing, to the astonishment and dismay of the surgeon, the dressings were forced off by a protrusion of several convolutions of small intestines; from this, it was proved, that the patient had had a hernia; but, the diseased enlargement of the testicle had acted as a truss, and prevented the rupture from coming down." (See *Operative Surgery, by C. Bell, Vol.* 1, *p.* 226, *also p.* 224.)

There is another circumstance, which merits attention in the performance of this operation: when there are reasons, which oblige us to divide the cord high up, and this part has not been tied before such division is made, it may be drawn up by the cremaster within the abdominal ring, and some difficulty may be experienced in securing the spermatic arteries. Mr. B. Bell saw this happen twice, and the patients lost their lives from

hemorrhage. Hence, when it is necessary to cut through the cord near the ring, the best plan is always to apply the ligature first, observing not to include the vas deferens. Were the cord, however, before being tied, to happen in any instance to be drawn up within the ring, a surgeon would be guilty of most supine neglect to let the patient die of bleeding; for, as Mr. C. Bell has remarked, we may follow the cord with perfect safety, even to the origin of the cremaster, which pulls it up, if attention be paid to the course of the cord, obliquely upward and outward, within the inguinal canal.

It sometimes happens, that abscesses form in the remains of the spermatic cord, after the operation of castration. Such suppuration may frequently be prevented by the employment of bleeding directly after the operation, and repeating the evacuation on the first access of the inflammation of the part concerned. Besides venesection, low diet, neutral salts, diluents, &c. are indicated, and the part should be covered with an emollient poultice. When the pus is completely formed, the abscess should be opened.

When the symptoms subside, observes M. Petit, they, who are little versed in practice, are apt to fancy the abscess cured; but, they are sometimes mistaken. The matter is not always sufficiently near the surface to be felt, and, in this circumstance, the aponeurosis of the external oblique muscle is so tense, that it hinders the fluctuation from being distinctly felt. Indeed, as the matter finds a lodgment under this aponeurosis, following the course of the sheath of the vessels, there is reason to fear, that it may lead to additional inflammation and suppuration, and extend up the duplicature of the peritoneum to the loins. In these cases, the abscess occasionally makes its way outward, and the dressings are inundated with matter; but, if this should not happen quickly, the sooner the tumour is opened the better. The opening ought unquestionably to be made wherever the fluctuation is plainly distinguishable; but, as Petit has remarked, the tension of the aponeurosis of the external oblique muscle makes the undulation of the matter less readily and plainly perceptible, than if the abscess were only in the fat. Therefore, in order to avoid mistake, this surgeon advises us to feel at the abdominal ring, as, in general, the pus can be more readily felt here, than in other situations. If matter is felt, and no resistance is experienced, Petit advises the finger to be passed into this opening, and, in case the seat of the abscess should be found to be under the aponeurosis, we are recommended to divide, with a probe pointed bistoury, the skin and fat immediately covering the ring, then to separate the fibres of this aperture, as it were, without cutting them. (See *Traité des Maladies Chirurgicales, Tom. 2, p. 529—530.*) No doubt, this surgeon meant, that the division of the tendon ought to be made in the direction of its fibres.

Consult *Le Dran's Operations. Sharp's Operations of Surgery, chap. 10. Pott on the Hydrocele, &c. Sabatier, de la Méd. Opér. Tom. 1. Bertrandi Traité des Opér. de Chirurgie, chap. 11. Œuvres Chirurgicales de Désault par Bichat, Tom. 2, p. 449. Larrey Mémoires de Chirurgie Militaire, Tom. 3, p. 423, &c. Pearson on Cancerous Complaints. J. L. Petit, Traité des Maladies Chirurgicales, Tom. 2, p. 519, &c. C. Bell's Operative Surgery, Vol. 1. Richerand's Nosographie Chirurgicale, Tom. 4, p. 281, &c. Edit. 2, &c. A long account of the particular sentiments of several eminent surgeons is to be found in Rees's Cyclopædia. art. Castration.*

CATAPLASM. (from καταπλασσω, to spread.) *Cataplasma.* A poultice.

The following ones are eminently useful.

CATAPLASMA ACETI. Made by mixing a sufficient quantity of vinegar with either oatmeal, linseed meal, or bread crumb. When linseed is employed, it is best to add a little oatmeal, or bread crumb, to keep the poultice from soon becoming hard. The vinegar poultice is generally applied cold, and is principally used in cases of bruises and sprains.

CATAPLASMA ACETOSÆ. *Sorrel Poultice.* ℞ *Acetosæ* lbj. To be beaten in a mortar into a pulp.

CATAPLASMA ÆRATUM. *Fermenting Poultice.* ℞ *Farinæ Tritici. Cerevisiæ Spumæ, Yest dictæ; singulorum,* ℔ss. These are to be mixed together and exposed to a moderate heat, till the effervescence begins. This is a celebrated application in cases of sloughing and mortification.

CATAPLASMA ALUMINIS. Made by stirring the whites of two eggs with a bit of alum, till they are coagulated. It has been applied to the eye, between two bits of rag, in some cases of chronic and purulent ophthalmy, and is said to do good to chilblains, which are not broken.

CATAPLASMA BYNES, (Malt.) ℞ Farinæ Bynes, Spumæ Cerevisiæ, q. s. This is applied to cases of gangrene and ill-conditioned extending sores. It is used in instances similar to those in which the cataplasma æratum is employed, and, by giving out carbonic acid gas, is supposed to operate as a gentle stimulus, and as a corrector of the fetid effluvia.

CATAPLASMA CARBONIS. Made

by mixing powdered charcoal with linseed meal and warm water, and is applied to improve the condition of several kinds of unhealthy sores.

CATAPLASMA CEREVISIÆ. Made by stirring some oatmeal, or linseed meal, in strong beer grounds. It is used in the same cases, as the Cataplasma Æratum, and Cataplasma Bynes.

CATAPLASMA CICUTÆ. *Hemlock Poultice.* ℞ *Herbæ cicutæ exfoliatæ* ℥ij. *Aquæ fontanæ* ℔ij. To be boiled, till only a pint remains, when as much linseed meal as necessary is to be added.

This is an excellent application to many cancerous and scrophulous ulcers, and other malignant ones; frequently producing a great diminution of the pain of such diseases, and improving their appearance. Justamond preferred the fresh herb, bruised.

CATAPLASMA DAUCI. *Carrot Poultice.* ℞ *Radicis Dauci recentis,* ℔j. Bruise it in a mortar into a pulp. Some, perhaps, with reason recommend the carrots to be first boiled. The carrot poultice is employed, as an application to ulcerated cancers, scrofulous sores of an irritable kind, and various inveterate malignant ulcers.

CATAPLASMA DIGITALIS. Made by mixing linseed meal with a decoction of the leaves of the plant. It is said to have great sedative virtues, to be adapted to the same cases, as the cicuta poultice, and even to be more beneficial.

CATAPLASMA FARINACEUM.—The bread and milk poultice, made by putting some slices of bread crumb in milk, and letting them gently simmer over the fire in a saucepan, till they are properly softened. The mass is then to be mixed and stirred about with a spoon, and spread on linen, in order to be applied. This poultice, which is of the emollient kind, is with many persons the common one for all ordinary purposes. Most surgeons, however, employ, instead of it, the linseed poultice, which is cheaper, more readily made, not apt to turn sour, and in all common cases, quite as advantageous in every respect.

CATAPLASMA LINI. *Linseed Poultice.* ℞ *Farinæ Lini* ℔ss. *Aq. ferventis* ℔iss. The powder is to be gradually sprinkled into the hot water, while they are quickly blended together with a spoon.

This is the best, and most convenient of all the emollient poultices for common cases, and has, in a great measure, superseded the bread and milk one, so much in use formerly.

Mr. Hunter speaks, in the following terms, of the linseed poultice, and its uses:

"Poultices are commonly made *too thin*; by which means, the least pressure, or their own gravity, removes them from the part: they should be thick enough to support a certain form when applied.

"They are generally made of *stale* bread, and milk. This composition, in general, makes too *brittle* an application; it breaks easily into different portions, from the least motion, and often leaves some part of the wound uncovered, which is frustrating the first intention.

"The poultice which makes the best application, and continues most nearly the same between each dressing, is that formed of the meal of linseed: it is made at once, and when applied, it keeps always in one mass."

"The kind of wound, to which the above application is best adapted, is a wound made in a sound part, which we intend shall heal by granulation. The same application is equally proper when parts are deprived of life, and consequently will slough. It is therefore the very best dressing for a *gunshot* wound, and probably for most *lacerated wounds:* for *lint*, applied to a part that is to throw off *a slough*, will often be retained till that slough is separated, which will be for eight, ten, or more days."

CATAPLASMA LYTHARGYRI ACETATI.

℞ Aquæ lythargyri acetati drach. j.
Aquæ distillatæ lib. j.
Micæ panis q. s.—Misce.

Practitioners, who place much confidence in the virtues of lead, externally applied, often use this poultice in cases of inflammation.

CATAPLASMA MALI MATURI. This is made by roasting a ripe apple, removing the peel and core, and beating the pulp into a soft mass. It is sometimes applied to inflamed eyes, by means of a little muslin bag.

CATAPLASMA MURIATIS SODÆ. ℞ *Pulveris Lini, Micæ Panis ā. ā. partes æquales, Aq. Sodæ Muriatæ q. s.* This is used for diminishing scrofulous tumours and glands. When it excites too much irritation in the skin, a linseed poultice may be put on for a little while.

CATAPLASMA QUERCUS MARINI.

This is prepared by bruising a quantity of the marine plant commonly called *sea tang*, which is afterwards to be applied by way of a poultice.

Its chief use is in cases of scrophula; white swellings and glandular tumours more especially.

When this vegetable cannot be obtained in its recent state, a common poultice of sea-water and oatmeal has been substituted by the late Mr. Hunter and other surgeons of eminence.

CATARACT. (from καταρασσω, to con-

found, or disturb; because the disease confounds, or destroys vision.) This is a species of blindness, arising almost always from an opacity of the crystalline lens, or its capsule; the cataract depending on an opaque state of the liquor of Morgagni being very rare.

Hippocrates called it, γλαυκωμα. Galen, ὑπυχυμα. The Arabians, *gutta opaca*. Celsus, *suffusio*.

Hippocrates and the ancient Greeks described the cataract, as a disease of the crystalline lens under the name above mentioned; but, no sooner had Galen promulgated the doctrine of the lens being the immediate organ of sight, than the correct opinion of the ancient founder of medicine began to decline, and, for many ages afterwards, had no influence in practice. In fact, the seat of the cataract seems to have been entirely forgotten, till about 1656, when first Lasnier, and, afterwards, Borel, Bonnetus, Blegny, Geoffroi, &c. revived the truth, which appears to have been so long extinct, and they, and a few others, believed that the disease was situated in the crystalline lens. The bulk of practitioners, however, remained ignorant of this fact even as late as 1713, or, in other words, until the several publications of Mery, Maître-Jan, Brisseau, and Heister, combined to render the truth universally known. (*Critical Reflections on the Cataract.*)

SYMPTOMS OF A CATARACT.

The cataract shews itself, as a speck, or spot in the pupil of the eye, occupying sometimes the whole, and sometimes only a part of this aperture. It is most commonly of a grey, or whitish colour; but, sometimes, of a deep white, and, it may, in all cases, be easily distinguished from the naturally dark appearance of the pupil. In the commencement of the disorder, it occasions a weakness, or imperfection of the sight; and it terminates, sooner, or later, in the almost total extinction of this sense. During its progress, the persons, who are affected by it, perceive objects more distinctly in a moderate, than a strong light; the reason of which is, that the pupil being more dilated in a weak light still admits some rays, through the yet transparent circumference of the crystalline. (*Wenzel on the Cataract.*)

A settled mist seems to cover objects, and confuse those, which are minute. In this disorder, especially, when it arises without any assignable external cause, this mist is almost always perceptible by the patient, before any opacity has become visible in the pupil. (*Ware.*)

DIFFERENT KINDS OF CATARACT, AND PARTICULAR SYMPTOMS OF EACH.

When the opaque lens is either more indurated, than in the natural state, or retains a tolerable degree of firmness, the case is termed, a *firm*, or *hard cataract*. When the substance of the lens seems to be converted into a whitish, or other kind of, fluid, lodged in the capsule, the case is denominated a *milky*, or *fluid cataract*. When the opaque lens is of a middling consistence, neither hard, nor fluid, but, about as consistent, as a thick jelly, or curds, the case is named a *soft, or caseous cataract*. When the anterior, or posterior, layer of the crystalline capsule becomes opaque, after the lens itself has been removed from this little membranous sac, by a previous operation, the affection is named a *secondary membranous cataract*.

There are no certain criteria, by which it can be ascertained previously to an operation, whether a cataract is soft or hard; of a caseous or fluid consistence; or whether, together with an opacity of the crystalline lens, the membranous capsule, in which it is contained, may not have lost its natural transparency; those formerly mentioned by Richter, and other similar ones proposed for consideration by Mr. Pott, cannot be sufficiently confided in, to form a guide in practice.

I think it right, however, to state, in as concise a manner as possible, the symptoms and appearances, which Richter has more recently explained, and, for a long series of years, found generally to portend the truth; and I shall confine myself to the hard, the fluid, and the caseous or soft cataracts.

The harder the cataract is, the thinner and smaller it becomes. In this case, the disease presents either an ash-coloured, a yellow, or a brownish appearance. The interspace, betwixt the cataract and pupil, is very considerable. The patient very distinctly discerns light from darkness, and can even plainly perceive large bright objects. In the dilated state of the pupil, a black circle surrounding the lens is very perceptible. The motions of the pupil are free and prompt. The anterior surface of the cataract appears flat without any degree of convexity. (*Richter's Anfangsgrunde der Wundarzneykunst*, *p.* 177. 3 *Band.*)

The fluid, or milky cataract, has usually a white appearance; and irregular spots and streaks, different in colour from the rest of the cataract, are often observable on it. These are apt to change their figure and situation, when frequent and sudden motions of the eyes occur, or when the eyes are rubbed and pressed; sometimes, also, these spots and streaks

vanish, and then re-appear. The lower portion of the pupil seems more opaque than the upper, probably, because the untransparent and heavy parts of the milky fluid, sink downward to the bottom of the capsule. The crystalline lens, as it loses its firmness, commonly acquires an augmented size. Hence, the fluid cataract is thick, and the opacity close behind the pupil. Sometimes one can perceive no space between the cataract and margin of the pupil. In advanced cases, this aperture is usually very much dilated, and the iris moves very slowly and inertly. This happens because the cataract touches the iris, and impedes its action. The fluid cataract is sometimes of such a thickness, that it protrudes into the pupil, and presses the iris so much forward, as to make it assume a convex appearance. Patients, who have milky cataracts, generally distinguish light from darkness very indistinctly, and sometimes not at all; partly, because the cataract, when it is thick, lies so close to the iris, that few or no rays of light can enter between them into the eye; partly, because the fluid cataract always assumes, more or less, a globular form, and therefore has no thin edge, through which the rays of light can penetrate. (*Richter's Anfangsgründe der Wundarzneykunst.* 3 *Band.* 174, 175.)

Sometimes the opaque lens is of a middling consistence, neither hard, nor fluid, but about as consistent as thick jelly, curds, or new cheese. Cases of this description are termed soft or caseous cataracts. As the lens softens in this manner, it commonly grows thicker and larger, even acquiring a much greater size than the fluid. It is not unfrequent to meet with caseous cataracts of twice the ordinary size of a healthy crystalline lens. It impedes the motion of the pupil more considerably than the fluid cataract, because it lies closer to the iris. It is accompanied with all the symptoms of fluid cataracts, except that the spots and streaks, sometimes also observable on this kind of cataract, do not vary their situation and figure. (*Richter's Anfangsgründe der Wundarzneykunst. p.* 178. 3 *Band.*)

CAUSES OF THE CATARACT.

Persons, who are much exposed to strong fires, as blacksmiths, locksmiths, glassmen, and those, who are engaged in similar employments, seem to be more subject to the cataract, than others. Persons, above the age of forty, are reckoned more liable to cataracts, than younger ones. (*Wenzel.*) The disease, however, is, by no means, unfrequent in the latter; even children are often seen affected with this kind of blindness, and some are born with it. In the majority of instances, a cataract seems to arise spontaneously, without any assignable cause. Sometimes the opacity of the lens is the consequence of external violence: a case, which, more frequently, than any other, gets well without an operation.

PROGNOSIS, AND MODE OF JUDGING OF CASES FIT FOR AN OPERATION.

Some little attention is necessary to distinguish those cases of cataract, which afford a reasonable prospect of benefit from an operation, and to discriminate them from others, either less promising, or absolutely prohibitory of relief.

When, in the incipient state of the disease, the patient discerned objects, as it were, through a mist, which increasing in density, at length became a complete impediment to vision; when the opacity of the crystalline lens has supervened gradually, and has not been preceded, and is not accompanied by a chronic ophthalmy peculiarly affecting the interior of the eye; when no particular head-ach, nor pains in the eye and eye-brow have been experienced; when the pupil, notwithstanding the cataract, preserves its circular figure, and the faculty of varying its dimensions in the different degrees of light; when the patient can distinguish a brilliant light from total darkness; and, especially, if in a moderate light, where, usually, the pupil is not too much contracted, he should be able to distinguish bright colours, and the shadows of objects before him: there is every reason for performing, and expecting success from, an operation. (*Scarpa sulle Malattie degli Occhi.*)

The power of distinguishing light from darkness, is much more satisfactory, than motion of the iris. I have seen in St. Bartholomew's Hospital, and in the York Hospital under Mr. Albert, several cases of complete gutta serena in both eyes, in which there was the freest contraction and dilatation of the pupils. It is obvious, that, had such patients been, at the same time, afflicted with cataract (a complication by no means unfrequent), and a surgeon, induced by the moveable state of the iris, had undertaken an operation, how unavailing it must have proved, since the rays of light could only have been transmitted to an insensible retina. Richter, and Wenzel, make mention of these peculiarities, and the latter refers the phenomenon to the iris deriving its nerves wholly from the lenticular ganglion, while the immediate organ of sight, is constituted entirely by another distinct nerve. Hence we can no longer consider motion of the iris as an infallible criterion, according to several authors, (*Wathen*) that

the retina is endued with sensibility. Relating to this subject, is a curious remark by Mr. Lucas in the Medical Observations and Inquiries: he attended, in conjunction with Messrs. Hey and Jones, his colleagues of the Leeds Infirmary, five children of a clergyman at Leaven, near Beverly, who were all born blind. He writes, "None of them can distinguish light from darkness, and, although the pupil is, in common, neither too much dilated nor contracted, and has motions, yet these do not seem to depend upon the usual causes, but are irregular."—(*Vol.* 6.)

The reciprocal sympathy between the two organs of sight, is so active, that no one, solicitous to acquire either physiological, or pathological knowledge respecting them, ought, for a moment, to forget it. Hence, in the examination of cataracts, it is of the highest importance to keep one eye entirely secluded from the light, while the surgeon is investigating the state of the iris in the other; for, the very impression of the rays of light upon one eye, sensible to this stimulus, is known to be often sufficient to produce corresponding motions of the iris in the opposite one, although in the state of perfect amaurosis. In other examples of cataract, the pupil may be quite motionless, and yet sight shall be restored after the performance of an operation. (*Wenzel.*) There are, however, two circumstances, which may prevent us from ascertaining, whether the retina is sensible to light or not: the first is, a circular adhesion of the crystalline capsule to the iris. It must be a difficult thing to discriminate the nature of this case, by merely observing, as Richter directs, the distance between the cataract and pupil: inferring, that when the space, between the pupil and opaque lens, is inconsiderable, such an adhesion has happened; and, that when the cataract does not seem particularly close to the pupil, and yet the patient cannot discern light from darkness, it is complicated with amaurosis. The second circumstance, sometimes utterly preventing the ingress of any light to the healthy retina, is the round bulky form of the cataract.

But although I have remarked, that the power of distinguishing light from darkness is more satisfactory, than motion of the iris; it is not an unequivocal test of the retina being perfectly free from disease. While the gutta serena is incomplete, the patient can yet distinguish light, and the shadows of objects. Dilatation of the pupil is, also, a deceitful criterion to ascertain the complication of gutta serena with the cataract. When the cataract is large, or adherent to the iris, the pupil is frequently much dilated, however natural and sound the state of the optic nerve may be: the pupil often continues quite undilated in the most perfect gutta serena. (*Richter.*)

From all this it must be manifest, 1st, that the irregularity, and inconstancy of the symptoms of gutta serena, together with the possibility of particular states of the cataract rendering the patient utterly unconscious of the stimulus of light, make it necessary for the surgeon to be particularly attentive to the appearance, and to the history of the origin and progress of the disease, in order to understand the real condition of certain cases. 2d, That, when the patient can distinguish light from darkness, though the iris may be motionless, there is good ground for trying an operation. Possibly, in this circumstance, an incipient *amaurosis* may exist, but, the *chance* of the defect of the iris arising from other causes; the *certainty*, that the opaque body *must* be removed from the axis of sight, (even were the disease of the retina cured,) ere sight could be restored; and the *improbability*, that an operation to cure the cataract, would render the other complaint at all less remediable; fully justify the attempt. 3dly, That, should the patient have been free from particular pain in the head and eye; should he, in a previous stage of the cataract, have been able to distinguish light from darkness, and then suddenly have lost that power, in consequence of inflammation affecting the eye, and depriving the iris of motion; in which case there is ample reason to conclude, that adhesions between the iris and cataract have taken place; and should there be ground to suspect, from the appearances which I have already noticed, that the cataract is of exceedingly large dimensions; notwithstanding the incapacity to feel the stimulus of light, there is yet sufficient foundation to entertain a little hope, and to vindicate the practice of the only effort that can be availing, and, excepting a trivial and a temporary pain, one that cannot be materially injurious to the patient. The concurrent testimony of almost all writers upon the subject confirms, that the restoration of sight has sometimes been effected in the most hopeless cases, and I am, therefore, of opinion with Mr. Lucas, that it is proper, in all doubtful cases, to try couching, as a remedy by no means violent, or hazardous. (*Med. Observations and Enquiries, Vol.* 6, *p.* 257.)

As it not unfrequently happens, that cataracts, produced by external violence, spontaneously disappear, (*Pott, Hey, &c.*) the operation should never be too hastily recommended for such instances. One reason, assigned for not operating, when

only one eye is affected, viz. that one eye is sufficient for the necessities of life, is but of a frivolous description; and, another, that the patient would never be able to see distinctly after the operation, by reason of the difference of the focus in the eyes, is (I have grounds for believing) only a gratuitous supposition, blindly transmitted from one writer to another. In support of what I have here advanced, and to prove, that success does sometimes, probably in general (if no other causes of failure exist,) attend the practice of couching and extraction, when only one eye is affected with a cataract, I shall first adduce a fact from Maitre Jan. (*Traité des Maladies de l'Oeil. Edit. Paris*, 1741, 12*mo*. *Obs. sur une Cataracte laitense, p.* 196.)

"Le 17 Octobre de l'année 1685. J'allai à Saviere pour abaiser une Cataracte dans l'oeil gauche d'un jeune garçon appellé Nicolas Very valet de Sebastien Coutan, laboureur. Cette cataracte me paroissoit d'une bonne couleur, la pupille se dilatoit lentement, et beaucoup, et se resserroit de même, quand je passois la main entre l'oeil et le grand jour, *le sain étant fermé*," &c. After describing the operation, he continues: "Quelques jours après je retournai le voir, et je trouvai que l'humeur aqueuse étoit fort éclaircie, et qu'il *distinguoit toutes sortes d'objets*: je le vis encore sept ou huit jours après en passant par son village, et je le rencontrai faisant son ouvrage, et entièrement guéri, sans qu'il parût qu'il eût jamais été incommodé de cataracte.

Baron Wenzel was in the habit of extracting cataracts with the most successful result, when only one eye was affected with the disease, as may be learnt by referring to the cases here specified. (*Cases* 6, 13, 16, 19, 22, 25, 29, 30, 31, 34, &c. *Treatise on the Cataract.*) It will only be necessary to quote here two cases, related by this eminent oculist. "Madame Harvey, a tobacconist, at Chalons sur Marne, presented a complicated case similar to the preceding. She had a cataract in the right eye, combined with an opacity in the anterior portion of the capsule, as appeared by the white spots and inequalities, of which I have spoken above, in the surface of the crystalline. *Her left eye was sound.* I operated on the right eye in the year 1782, &c. The patient suffered some pain in consequence of the operation, but it was soon removed by bleeding her in the foot; and, notwithstanding this obstacle, the sight was soon recovered to as great a degree of perfection as was possible after such an operation." (*Wenzel on the Cataract, p.* 138, *Case* 16.)

The following case is as explicit as possible on the point under consideration. "A poor woman, de la Ferté sous Jouarre, who had a cataract in the right eye upwards of ten years, came to consult me in the year 1780. I found all the symptoms of the case favourable to an operation," &c. (after describing the manner of doing it, he continues); "I immediately bound up, not only the eye that had undergone the operation, but the *sound one* also; a precaution, which it is necessary to use after all operations on the eye, even the most simple; it being almost impossible, that one eye should not follow the motions of the other, &c. In a fortnight she was perfectly cured; and, though the pupil remained larger than it was before the operation, or than that in the left eye, and had much less motion, yet this eye, as well as the other, perceived objects very distinctly." (*Case* 22, *p.* 166. *In the Medical and Physical Journal for May* 1808, *there is a paper in support of the foregoing observations.*)

I next proceed to notice what Richter has remarked upon this head. He was formerly convinced, that the advice not to operate, when only one eye is affected with a cataract, ought, for several reasons, to be disregarded; he reminds us of the wonderful consent between the eyes, so that one is seldom diseased without the other, sooner or later, falling into the same state; and hence he questions, whether it may not be possible to prevent the loss of the sound eye by a timely operation? An non caveri possit jactura integri oculi tempestive extrahendo cataractam prioris? Obs. Chir. Fascic. I.) He adverts to the remarkable case related by St. Ives, where a man was wounded in the right eye by a small shot, and, shortly afterwards, had a cataract in it; he then gradually became blind in the left, but soon recovered his sight in it, after the cataract had been extracted from the right one. Here let us notice, that St. Ives (*Maladies des Yeux, Chap.* 15, *Art.* 3.) makes no mention of any confusion in vision, in consequence of the different refracting powers of the two eyes in question. Another reason, judiciously assigned by Richter, (*Obs. Chirurg. Fascic.* 1.) for disregarding the above precept, is, that in waiting until a cataract forms in the other eye, the existing one, which is at this moment, perhaps, in the most favourable state for the operation, may soon change so much for the worse (for instance it may contract such adhesions to the iris), as either to destroy all prospect of relief, or, at most, afford but a very precarious and discouraging one. The length of time necessary to wait is also very uncertain and tedious. I once saw a man in St. Bartholomew's Hospital, who had had a cataract in one eye fifteen years, during all which time the other continued quite sound. I am surprised that Richter should latterly have inculcated a contrary opinion, and, not given the particular facts, that have

induced him to revoke, as it were, his former sentiments. The principal reason stated by him is, that the patient, not only does not see much more acutely with the two eyes after the operation, than with one before it, but, he frequently sees more confusedly; because the eye, that has been operated on, cannot see well without the aid of a glass, which, perhaps, the sound ones does not require. "Er sieht nicht allein nach der Operation mit zwey Augen nicht viel schärfer, als vor der operation mit einem Auge, sondern er sieht auch oft undeutlicher, da das operirte Auge nicht ohne Brille, das gesunde aber vielleicht ohne Brille scharf siehet." (*Anfangsgrunde der Wundarzn. Dritter Band p.* 199.)

When I remember, that no cases are adduced by this author to contradict the rationality of his former sentiments; when I also reflect upon the facts recorded by Maitre-Jan, St. Ives, and Wenzel; when I contemplate, that Callisen mentions, as the feeble ground of his adopting the common opinion, that, in one single instance of this description, he was unsuccessful, without particularizing from what immediate cause the failure arose; there appears to my mind strong cause to believe, that the advice, not to operate, when there is only one cataract, and the other eye is perfect, rests upon the false basis of prejudice and plagiarism. Warner's objection is similar to that specified by Richter: he writes, "the eye, from which the crystalline lens is removed, cannot be restored to a degree of perfection at all equal to that of the sound eye, without *the assistance of a convex glass*:" (*Description of the Human Eye and its Diseases, p.* 85.) but, is not the power of using both eyes at the same time, even with the inconvenience of being necessitated to employ a glass for the purpose, preferable to being blind of one? The cases, which I have quoted, at least prove, that confusion in vision, is not always the result of the practice, which I contend for: whether the fact is concordant with the modern theory of vision, is entirely another consideration; if it should be found inconsistent with it, we must infer, that our knowledge of optics still continues imperfect; not, that such well-attested examples, as some alluded to, are unworthy of belief.

When there are cataracts in both eyes, most authors are of opinion, that there is no reason, why one should not be couched immediately after the other; and, it must be confessed, that, in general, the simplicity and mildness of the operation, will admit of this method without the least evil resulting from it. But it must also be confessed, that the ophthalmy after couching sometimes attains a greater height than is agreeable, either to the feelings of the patient, or the wishes of the surgeon. The excitement of violent inflammation, is what we ought to endeavour to avoid in performing all operations. Will it not inevitably happen, by reason of the mutual sympathy between the two organs of sight, that the ophthalmy after couching will, *cæteris paribus*, be more severe when it is done at the same time on both, than when performed on each at separate periods? Inflammation in one eye almost constantly kindles the same process in the other. Scarpa's experience establishes the truth of these reflections, and, what reason might anticipate, an appeal to practice confirms. "Ne' malati di cateratta in ambedue gli occhi, la sperienza mi ha insegnato che non è punto vantaggioso l'operarli immediatamente uno dopo l'altro; ma che giova aspettare la guarigione d'uno prima d'intraprendere l'operazione dell'altro." (*Saggio di Osservazioni, &c. p.* 255.)

The majority of surgeons imbibe an opinion, that no operation should be undertaken for the cataract, before the patient has attained the age of docility and reason, and, in a point of view, abstractedly surgical, there can be no doubt of the rectitude of such advice; but, when it is further considered, how essential sight is to the acquirement of education; that youth is the condition best adapted for this indispensable pursuit; that couching is a very easy operation; that, to perform it conveniently, nothing more is required, than to have the child's head steadily fixed; that, with the aid of an assistant, this object can more effectually be accomplished; that, in delaying the operation, the cataract may acquire adhesions; that persons have, not only had cataracts successfully depressed at a very early age, but, have, with the assistance of a *speculum oculi*, even had them extracted, (See *Mr. Ware's note, p.* 90, *of Wenzel's Treatise.*) which is universally acknowledged to be a far more difficult process; and that the pupil of the eye, in a young subject, is nearly as large as in an adult; (*Warner's Description of the Human Eye and its Diseases, p.* 34.) I cannot help thinking with Mr. Lucas, that, after a child is old enough to bear an operation, couching *may be proper* at any age. This gentleman (we may infer from his observations) was in the habit of couching children; for he states, that the reason for his not operating on the five children born blind (mentioned above), was the insensible state of the retina: not their youth.

Here couching seems to be more applicable than extraction; for, although it is very practicable to fix a child's head very securely, it is not so to prevent (without the use of a speculum, by which extraction is rendered doubly dangerous) that rolling motion of the eyes from taking

place, peculiar, almost without exception, to children, and which would, undoubtedly, make it too arduous to cut the cornea with the due precision, necessary for the success of the more modern operation. Surgeons do not refuse to operate for the hare lip, as early as two years of age; they do not wait for docility and reason in the patient, to make him manageable, and sensible of the propriety of submitting quietly to the performance of the operation; they render him tractable by force, and thus they wisely succeed in making, perhaps, with more certainty, than reliance upon the fortitude of any human being would afford, a very precise incision, such as the nature of the operation demands; and, why should they refuse to couch children, when the motives are more urgent, and it is equally in the power of art to substitute means, quite as effectual as docility and reason in surgical patients? What experienced operator would trust to these qualities, when he undertakes any grand operation, even on the most rational and firm adult? (*Critical Reflections on the Cataract*, 1805.)

During the last four or five years, the attention of surgeons has been much drawn to the subject of operating on the cataracts of children, and the propriety of the practice seems to be now firmly fixed on the basis of experience. It is even ascertained, that the couching needle may be successfully employed on children of the most tender age. The late Mr. Saunders, surgeon to the London Infirmary for curing diseases of the eye, may be said to have had the principal share in promoting the adoption of this important improvement. His practice confirmed, what reason had long ago made probable, and the judgment, tenderness, and skill, with which he operated, on the eyes of infants, as well as those of adults, were followed by a degree of success, which had never been previously witnessed, and which infused quite a new spirit into this most interesting branch of surgery. Subjects, from eighteen months to four years old, received most benefit from Mr. Saunders's operations; and, if any intermediate time be selected, Dr. Farre (the editor of this gentleman's publication) is inclined to recommend the age of two years. "The parts have then attained a degree of resistance, which enables the surgeon to operate with greater precision, than at an earlier period; yet, the capsule has not become so tough and flexible, as it does at a later period, after the lens has been more completely absorbed.

"But, this is not the greatest, although a considerable advantage of an early operation, for, in cases, in which the patient has no perception of external objects, the muscles acquire such an inveterate habit of rolling the eye, that, for a very long time after the pupil has been cleared by an operation, no voluntary effort can control this irregular motion, nor direct the eye to objects with sufficient precision for the purpose of distinct and useful vision. The retina too by a law, common to all the structures of an animal body, for want of being exercised, fades in power. Its sensibility, in many of the cases, cured at the ages of four years and under, could not be surpassed in children, who had enjoyed vision from birth; but, at eight years, or even earlier, the sense was evidently less active; at twelve, it was still more dull; and from the age of fifteen and upwards, it was generally very imperfect, and sometimes the mere perception of light remained. But, these observations do not apply to those congenital cataracts, in which only the centre of the lens and capsule is opaque, the circumference being transparent, for, in those, the retina is exercised by a perception, although an imperfect one, of external objects, the motions of the muscles, which direct the globe, are associated, and an absorption of the lens does not take place: therefore, in this variety of the disease, the argument in favour of an early operation, is not so much a medical, as a moral one—it is preferable for the purposes of education and enjoyment." (*Saunders on Diseases of the Eye, p.* 153—155.)

Besides Mr. Saunders, several other surgeons of the present day have become zealous advocates for operating upon the cataracts of children. Even Mr. Ware, one of the ablest partisans of extraction, now strongly recommends the use of the needle in the congenital cataract of infants and children. His mode of operating, I shall hereafter notice. Mr. Gibson, of Manchester, has likewise urged the propriety of couching young subjects, and fixes on the age of six months, as preferable to that of two years. "Whatever objections (says he) have been urged against the safe and effectual use of the couching needle in infants, have always appeared to me so slight, and so easily surmountable, that, without inquiring particularly into the real state of the question, I have long concluded in my own mind, that the same motives, which would induce an operator to couch a cataract at any period of adult life, would equally lead him to perform that operation at any earlier period, when a cataract might exist. Acting upon this presumption, *I have operated upon children of all ages, for ten years past.*" (See *Edinb. Med. and Surgical Journal, Vol.* 7, *p.* 394.)

Mr. Gibson's paper being dated June, 1811, we are of course given to understand, that he has pursued this practice from the year 1801, and he asserts that his experience has embraced a considerable number of cases.

"In performing the operation of couching infants, it has always appeared to me, (says this gentleman), that the advantages to be gained by restoring vision at so early a period, are so important, as to bear down any obstacles which may occasionally be opposed to the safe use of the needle. Even the risk of deranging the figure of the pupil forms no solid objection to its use; and may always be avoided by steadiness and good management. Should even a slight change in its figure be produced, it is seldom in the least detrimental to distinct vision, and can scarcely be considered a blemish in the eye of any one; except, perhaps, in that of a geometrician; who may not easily reconcile to himself the presence of an oval opening, where one of a circular form should exist. It may farther be observed, that, if an operator cannot depend upon his management of the eye, so as to render it steady by the introduction of the couching needle, he can avail himself of the assistance of a speculum to restrain its motions.

"The following observations will apply principally to infants under twenty months old. The advantages, which an operator possesses, in operating upon a child of this age, as compared with a child of three years old, or upwards, are important. An infant is not conscious of the operation intended: it is free from the fears created by imagination, and can oppose very feeble resistance to the means employed to secure it with steadiness. At an early age, it has not acquired the power of retracting the eye deep in the socket, so that the operator has always a good prospect of introducing the couching needle with ease, by watching a proper opportunity. The eye has not, at this time, acquired the unsteady rolling motion, which, after a few years, is so common and remarkable in children born blind, or reduced to that state soon after birth. So that this impediment to the easy introduction of the needle does not exist in infants a few months old. The operator also has it in his power to administer a dose of opium, sufficient to render the steps necessary to expose the eye, almost entirely disregarded by his patient. With respect to the state of the eye itself, but, particularly, that of the cataract, this is more favourable for the operation, than at any future period of life. *In infants, the cataract is generally fluid*, and merely requires the free rupture of its containing capsule, which is in that case generally opaque. The capsule, however, is tender, and easily removed by the needle, so as to leave an aperture sufficiently large for the admission of light. The milky fluid, which escapes from the capsule, is soon removed by absorption. If, on the other hand, (says Mr. Gibson) the cataract should be soft, it is generally of so pulpy a softness, that the free laceration of the anterior part of its capsule, and the consequent admission of the aqueous humour, ensures its speedy dissolution, and disappearance, without the necessity of a second operation. Should the cataract happen to be hard, there will be no more difficulty in depressing it, than in an adult. So uniformly favourable is the state of the cataract to the success of the operation, that I may venture to pronounce, that an operator of common experience and expertness, will seldom fail of success, if he can, in an adult, depress a hard cataract, or rupture the containing capsule, and break down the substance of a soft, or fluid cataract when it occurs.

"Such (continues Mr. Gibson) are the advantages, derived from the age of the patient, and state of the eye, which would induce an operator to use the couching needle a few months after birth. If, however, a surgeon had even difficulties to encounter, which do not occur in adults, surely the invaluable benefit, conferred by enabling an infant to become an intelligent being, like other children, instead of remaining in a state approaching to idiotism, would incline him to run some risk of failure, and to make more than common exertion, especially as there is little chance of injuring the eye, when proper cautions are used. Yet, so important a consideration appears to have had little influence upon oculists, and hence, many children have been doomed to years of darkness, happy in the estimation of their parents and friends, if they could distinguish black from white; or discern any perceptible difference between the brightness of the sun, and the glimmering of a tallow candle.

"These advantages, which an operator will possess, when he attempts the removal of a cataract in a child of a few months old, are peculiar to that period. In proportion as the age of the patient advances, until he arrives at the age of discretion, and can estimate, in some measure, the value of sight, by feeling his loss, the difficulties, opposed to the use of the couching needle, increase. His fears of the operation, the unsteadiness of the eye, and his power of retracting it within the orbit, present considerable, but not insuperable obstacles: such, however, as every surgeon would willingly dispense with, if he had it in his power.

"Before an operation, at an early age is recommended, the practitioner ought (as at any other age) to ascertain, that the cataract is not complicated with a defective state of the retina, or with a complete amaurosis. Such cases are by no means uncommon. Some years ago, I recollect to have seen five or six children, the families of two sisters, who were all totally

blind, and in an idiotic state, with cataracts accompanied by amaurosis." (*Gibson Op. et loco cit.*

I find in this gentleman's paper, also, some arguments, which have been repeated in Mr. Saunders's work. "Few practitioners, at all conversant with cases of blindness from birth, will deny, that it is highly probable, that the eye may lose a considerable part of its original powers, from the mere circumstance of its having so long remained a passive organ. Hence, probably it happens, that, in some cases of congenital cataract, the only benefit conferred on the patient, by an operation, is that of enabling him to find his way in an awkward manner, and to discriminate the more vivid colours. Such patients have never been able to discern small objects, or to judge, in any useful degree, of figure, or magnitude; I am well aware, however, says Mr. Gibson, that, in some rare instances, such a defective state of the eye exists from birth.

"Another circumstance, which must have attracted the attention of oculists, is, that, in a few years, the eye of a patient born blind, acquires a restless and rolling motion, which is at length so firmly established by habit, that he has little controul over it. This motion unfortunately continues, for a considerable time, after sight has been restored to such a person, and is a very material obstacle to the early attainment of a knowledge of the objects of vision. He cannot fix his eye steadily upon one point for a moment, and the inconvenience, which arises from this unsteadiness, is, to such a person, occasionally as great a bar to the distinct view of an object, as the unsteady motion of the same object would be to one, whose vision is perfect. This inconvenience any one can appreciate, and, as far as I know, it is completely avoided by restoring sight at an early age."

As a motive for operating on infants, Mr. Gibson also comments on the loss of those years, which ought to be spent in education. (See *Edinb. Med. and Surgical Journal, Vol.* 7, *p.* 394—400.)

TREATMENT OF THE CATARACT.

The principal external remedies, that have been employed in the cure of the cataract, are, bleeding, cupping, scarifying, setons, issues, blisters, and fumigations; and the principal internal remedies are, aperients, incisives, emetics, cathartics, sudorifics, cephalics, and sternutatories. Preparations of eye-bright, millepedes, wild poppy, henbane, and hemlock, have also been much commended, as specifics for the disorder.

Scultetus asserts, that he checked the progress of a cataract, by applying to the eye the gall of a pike, mixed with sugar; and Spigelius, as we are informed by the same author, boasted of having successfully used, for this purpose, the oil of the eel-pout (*mustela fluviatilis.*)

Cataracts are said to have been cured in venereal patients, while under a course of mercury. It is probable, however, that many such cases have been mere opacities of the cornea, which have been mistaken for cataracts. Baron Wenzel placed no reliance whatever in the power of any remedies to dissipate a cataract, and, as he had remarked their inefficacy in numerous instances, he felt authorized in declaring, that internal remedies, either of the mercurial, or any other kind, are inadequate to the cure of this disorder; and equally so, whether the opacity be in the crystalline, or in the capsule, whether incipient, or advanced.

Although Mr. Ware coincides with Wenzel, in regard to the uncertainty of all known medicines to dissipate an opacity, either in the crystalline, or its capsule, or even to prevent the progress of such opacity, when once begun, yet, many cases have proved, that the powers of nature are often sufficient to accomplish these purposes. The opacities, in particular, which are produced by external violence, Mr. Ware has repeatedly seen dissipated in a short space of time, when no other parts of the eye have been hurt. In such cases, the crystalline lens has generally been absorbed, as is proved by the benefit, which has afterwards been derived from deeply convex glasses. In some of these cases, though the crystalline has been dissolved, the greater part of the capsule has remained opaque, and the light has been transmitted to the retina only through a small aperture, which has become transparent in its centre. Instances are also not wanting, in which cataracts, formed without any violence, have been suddenly dissipated in consequence of an accidental blow on the eye. The remedies, which Mr. Ware has found more effectual, than others, have been the application to the eye itself of one, or two drops of æther, once, or twice, in the course of the day, and the occasional rubbing of the eye, over the lid, with the point of the finger, first moistened with a weak volatile, or mercuria liniment.

Cataracts are usually cured, either by removing the opaque lens, from the axis of vision by means of a needle; or by extracting the lens from the eye, through a semicircular incision, made at the lower part of the cornea. The first operation is termed *couching*, or *depression of the cataract*; the second is named *extraction*. Some account of the congenital cataract, and method of operating upon children, will be found in the future part of the present article.

EXTRACTION OF THE CATARACT.

As soon as it was fully proved, that the true cataract was an opacity, of the crystalline humour, that the loss of sight would not be occasioned by the removal of this humour, that the cornea may be divided without danger, and that, if the aqueous humour be discharged, it will be quickly regenerated, the mode of cure, by extracting the cataract out of the eye, would naturally present itself to the mind. (*Wenzel.*)

Freytag was the first operator, who made an attempt to extract the cataract, about the close of the 17th century. After him Lotterius of Turin, performed this operation. Daviel, first communicated this method to the public. And the ingenuity and industry of Wenzel brought this mode of operating to a state of perfection never before attained. (*Brambilla Instrumentarium Chirurgicum Austriacum*, 1782, *p.* 71.)

Wenzel's knife resembles the common lancet employed in bleeding, excepting that its blade is a little longer, and not quite so broad. Its edges are straight, and the blade is an inch and a half (eighteen lines) long, and a quarter of an inch (three lines) broad, in the widest part of it, which is at the base. From hence it gradually becomes narrower towards the point; so that this breadth of a quarter of an inch extends only to the space of about one-third of an inch from the base; and, for the space of half an inch from the point, it is no more than one-eighth of an inch broad.

The lower edge of the knife, by which is meant, that which is lowest during the operation, is sharp through the whole length of the blade. At the distance of a quarter of an inch from the base, this lower edge has a slight projection, which is of use in making the section through the cornea. The upper edge Wenzel divides into three portions. For the space of five-sixths of an inch from the basis, this edge is blunt, and very slightly flattened. For the space of half an inch, or rather six lines and a half, further towards the point, it is blunt and rounded; although to the naked eye this part appears sharp, on account of its being very thin. And the extremity of this edge, to the extent of one-eighth of an inch from the point, is keen, like the lower edge, in order to facilitate the conveyance of the instrument through the cornea.

The swelling in the middle of the blade is merely intended to prevent the instrument from breaking. The handle, in which the blade is fixed, has eight sides, which are alternately large and small. This form enables the operator to hold the instrument more firmly, which is not so apt to turn round in the hand. It is generally three inches and two-thirds in length, and, from two lines, to two and a half, in thickness. The blade is so fixed in the handle, that the two sides of the former lie parallel with the broadest side of the latter. On the upper side of the handle, which answers to the upper, or blunt edge, of the knife, a small mark is placed, which directs the proper manner, in which the instrument should be held in performing the operation.

The shape of this knife is well calculated to effect the division of the cornea, with the utmost ease and safety, as it cuts this membrane, in proportion as it enters the eye. (*Wenzel.*)

The knife employed by Mr. Ware, is, in regard to its dimensions, not unlike the instrument employed by the Baron. The principal difference between them is, that Mr. Ware's knife is less spear-pointed; in consequence of which, when this latter instrument has pierced through the cornea, its lower, or cutting edge will sooner pass below the inferior margin of the pupil, than the knife used by Wenzel. On this account, Mr. Ware is of opinion, that the iris will be less likely to be entangled under the knife, which he recommends, than under Wenzel's, when the instrument begins to cut its way downwards, and the aqueous humour is discharged. Mr. Ware particularly advises great care to be taken to have the knife increase gradually in thickness from the point to the handle; by which means, if it be conducted steadily through the cornea, it will be next to an impossibility, that any part of the aqueous humour should escape, before the section is begun downwards; and, consequently, during this time, the cornea will preserve its due convexity. But, if the blade should not increase in thickness from the point; or if it be incurvated much in its back, or edge, the aqueous humour will unavoidably escape, before the puncture is completed; and the iris, being brought under the edge of the knife, will be in a great danger of being wounded by it. (*Ware.*)

Baron Wenzel considers all instruments, invented for fixing the eye, quite unnecessary: they render the operation more complicated, more dreadful to the patient, more embarrassing to the operator, and they are very liable to irritate and wound the eye. If the above oculist could approve of any kind of speculum, he should give the preference to Rumpelt's instrument, which is nothing more than a thimble, at the end of which is a sharp pointed instrument, like the pique of Pamard. The thimble is to be placed on the middle finger of the operator, and it has the advantage of not obstructing the use of the forefinger, but leaves it

at liberty to keep down the lower eyelid.

The pressure, occasioned by all contrivances for fixing the eye, is a serious objection to their employment, as such pressure is apt to cause a sudden protrusion and loss of great part of the vitreous humour. (*Wenzel.*)

Mr. Ware coincides very much with Wenzel on the subject of specula. At the same time, he remarks, that, in some instances of children born with cataracts, he has been obliged to fix the eye with a speculum; without the aid of which, he has found it totally impracticable to make the incision through the cornea, with any degree of precision, or safety. His speculum is an oval ring, the longest diameter of which is about twice as long as the diameter of the cornea, and the shortest about half as long again as this tunic. Annexed to the upper rim of the speculum is a rest, or shoulder, to support the upper eyelid; and, by its lower rim, it is fixed to a handle of such a length, and bent in such a way, as may render it convenient to be held. (*Ware.*)

When the patient is to undergo the operation, he should be seated in a low chair, before a light, which is not too bright, and, which, consequently, does not occasion too great a contraction of the pupil. The sound eye being covered with a compress, an assistant, placed behind, must hold the patient's head, and support it on his breast. With the forefinger of the hand that is at liberty, he is then to raise the upper lid of the eye to be operated upon, and gently press the tarsus, with the extremity of the finger, against the upper edge of the orbit, avoiding all undue pressure on the eye.

The operator is to be seated in a chair, a little higher, than that of the patient. The eyes naturally turning towards the light, he is to place the patient's head obliquely at a window, so that the eye to be operated upon may be inclined towards the outer angle of the orbit. This position will enable the operator to bring out the knife, on the inner side of the cornea, opposite to the part, where it pierces this tunic, more exactly, than he would otherwise be able to do. The operator is to rest his right foot on a stool, placed near the patient, that his knee may be raised high enough to support the right elbow, and to bring the hand, with which he holds the knife to a level with the eye, on which he is to operate. He is then to take the cornea knife in his right hand, if it be the left eye, on which he is to operate, and, *vice versa*, in the left hand, if it be the right eye. The knife is to be held like a pen in writing, and the hand is to rest steadily on the outer side of the eye, with the little finger, separated a little from the rest, on the edge of the orbit. In this position, the operator should deliberately wait, till the eye becomes quite still. (*Wenzel.*)

When the eye is perfectly quiet, and so turned towards the outer angle, that the inner and inferior part of the cornea can be distinctly seen, through which Wenzel recommends the point of the knife to be conveyed, the operator is to plunge the knife into the upper and outer part of this tunic, a quarter of a line distant from the sclerotica, in such a direction, that it may pass obliquely from above, downwards, parallel to the plane of the iris. At the same time, the operator must depress the lower lid with his fore and middle fingers, taking care to avoid all pressure on the eyeball. (*Wenzel.*)

Mr. Ware does not approve of this plan of leaving the eye unfixed, while the incision is made through the cornea. The danger likely to arise from undue pressure, can only take place, after the instrument has made an opening into the eye: but, the pressure, which Mr. Ware advises, in order to fix the eye, is to be removed the instant the knife is carried through the cornea, and before any attempt is made to divide this tunic downwards. To understand this subject better, however, the reader should know, that Mr. Ware divides the incision of the cornea into two distinct processes; the first of which may be called *punctuation*, and the second *section*. So long, says Mr. Ware, as the knife fills up the aperture, in which it is inserted, that is, until it has passed through both sides of the cornea, and its extremity has advanced some way beyond this tunic, the aqueous humour cannot be discharged, and pressure may be continued with safety. The punctuation of the cornea being completed, the purpose of pressure is fully answered; and, if such pressure be continued, when the section of the cornea begins, instead of being useful, it will be hurtful. To avoid all bad effects, Mr. Ware recommends the cornea to be cut in the following way.

The operator is to place the fore and middle finger of the left hand, upon the tunica conjunctiva, just below, and a little on the inside of the cornea. At the same time, the assistant, who supports the head, is to apply one, or, if the eye projects sufficiently, two of his fingers, upon the conjunctiva, a little on the inside and above the cornea. The fingers of the operator and assistant, thus opposed to each other, will fix the eye, and prevent the lids from closing. The point of the knife is to enter the outside of the cornea, a little above its transverse diameter, and just before its connexion with the sclerotica. Thus introduced, it is to

be pushed on slowly, but steadily, without the least intermission, and in a straight direction, with its blade parallel to the iris, so as to pierce the cornea towards the inner angle of the eye, on the side, opposite to that, which it first entered, and till about one-third part of it is seen to emerge beyond the inner margin of the cornea. When the knife has reached so far, continues Mr. Ware, the punctuation is completed. The broad part of the blade is now between the cornea and the iris, and its cutting edge below the pupil, which of course is out of all danger of being wounded. As every degree of pressure must now be taken off the eyeball, the fingers, both of the operator and his assistant, are instantly to be removed from this part, and shifted to the eyelids. These are to be kept asunder by gently pressing them against the edges of the orbit; and the eye is to be left entirely to the guidance of the knife, by which, says Mr. Ware, it may be raised, depressed, or drawn to either side, as may be found necessary. The aqueous humour being now partly, if not entirely evacuated, and the cornea of course rendered flaccid, the edge of the blade is to be pressed slowly downward, till it has cut its way out, and separated a little more, than half the cornea from the sclerotica, following the semicircular direction, marked out by the attachment of the one to the other.—(*Ware.*)

As soon as the point of the knife had arrived opposite the pupil, Wenzel used to incline it gently backward, and thus puncture the capsule of the crystalline. But, Mr. Ware very properly objects to this method of opening the capsule with the instrument used for cutting the cornea, and at the same time. The plan may exhibit dexterity; but, is of no use, and is often attended with considerable danger of wounding the iris.

In the eyes of some persons, the iris is convex, and it is almost impossible to complete the section of the cornea, without entangling the iris under the edge of the knife, unless a particular artifice be adopted. Wenzel, in this circumstance, recommends gently rubbing the cornea downward with the finger; one of the most important directions, according to Mr. Ware, in the Baron's whole book.

Wenzel imputed several advantages to the oblique manner, in which he used to divide the cornea. The best modern oculists, however, do not attribute any superior uses to this method, and consequently do not imitate it.

If the edge of the knife should incline too much forward, and its direction be not altered, the incision in the cornea will be too small, and terminate almost opposite the pupil. In this case, there will be great difficulty in extracting the cataract, and the cicatrix afterwards will often obstruct sight. If, on the contrary, the edge of the instrument be inclined too much backward, and its direction be not changed, the incision will approach too near the part, where the iris and sclerotica unite, and there will be great danger of wounding one, or the other of these coats of the eye. Both these accidents may be prevented by gently rolling the instrument between the fingers, until the blade takes the proper direction. (*Wenzel.*)

Mr. Ware has seen operators, through a fear of wounding the iris, introduce and bring out the instrument at a considerable distance before the union of the cornea and sclerotica; in consequence of which, the incision from one side of the cornea to the other has been made too small to allow the easy extraction of the cataract, although from above downward, it was fully large enough for this purpose. Mr. Ware has also sometimes observed, that though the punctuation of the cornea, from side to side, has been properly conducted, and its section, afterwards, to all appearance, effectually completed, yet, on account of the frictions, employed to disengage the iris from the edge of the instrument, the knife, in cutting downward, has been carried between the layers of the cornea, and, consequently, though the incision has appeared externally, to be of its proper size; internally, it has been much too small for allowing the cataract to be easily extracted. In this case, the incision must be enlarged, by means of a pair of curved blunt-pointed scissars, which should be introduced at the part, where the knife first entered the cornea. (*Ware.*)

After the knife has pierced through the cornea, and while it is cutting its way downward, the assistant, to whose care the upper eyelid is entrusted, is gradually to let it drop, in order to prevent the cataract from escaping too hastily. Then the whole charge of the eye devolves solely on the operator, who is to solicit the extraction of the cataract by gentle pressure on the upper part of the globe, the capsule of the crystalline having been previously opened.

Wenzel himself does not recommend opening the capsule of the crystalline, in every instance, at the same time, that the cornea is cut. In cases, where the pupil is much contracted, as well as in those, where the muscles of the eye and eyelids are easily thrown into convulsions, it is improper, says he, to puncture the capsule when the section is made through the cornea. This is also improper when the space, between the crystalline, and the iris, termed the posterior chamber, is

large. In all such cases, Wenzel acknowledges, that it is better simply to divide the cornea in the first instance, and then to puncture the capsule with a different instrument.

Wenzel and his father used to employ, for this purpose, a flat needle, one line, that is, one twelfth part of an inch, in diameter, having its cutting extremity a little incurvated. This needle, which should be made of nealed gold, that its pliability may allow the operator to bend it in different directions, as occasion requires, is fixed in a handle, two inches and a half in length, and similar to that of the cornea knife. At the other extremity of the same handle a small curette, or scoop, is fixed, made also of nealed gold, which is of use to extract the cataract.

When the crystalline, dislodged from its capsule, protrudes through the wound in the cornea, its removal from the eye may sometimes be assisted by the use of the above needle; and afterwards the opaque and glutinous matter, remaining, must be removed by means of the curette.

It is always advisable, after the operation, gently to rub the anterior part of the cornea over the lids, either with the thumb, or the curette. This process usually collects in the centre of the pupil some small fragments of opaque matter, which the crystalline leaves behind it, and which, if not taken away with the curette, might give rise to a particular kind of secondary cataract. The curette is also of use for replacing the iris, a portion of which membrane occasionally comes through the incision in the cornea. (*Wenzel.*)

Sometimes the cataract is hindered from coming out, on gentle pressure being made, in consequence of adhesions. Wenzel recommends these to be broken by means of the golden needle, introduced under the cornea, and applied in different directions, according as the case requires, and more especially round the circumference of the crystalline.

Sometimes, when the capsule of the crystalline is destroyed, and the crystalline itself is perfectly free, this humour plunges to the inferior part of the vitreous humour, leaving only its upper edge visible through the pupil. The hyaloid membrane is also most commonly destroyed, and the vitreous humour in a state of fluidity. All pressure, therefore, on the eyeball, must be avoided, since this would produce a large evacuation of the vitreous humour. The only method is to introduce through the pupil, a small steel hook to take hold of the crystalline, which, in this case, is often very small, and with this instrument to extract it from the eye. (*Wenzel.*)

When the capsule used to become opaque after the operation, so as to form, what is termed, the secondary membranous cataract, Wenzel, after dividing the cornea, used to remove the opaque substance, by means of a small pair of forceps.

After the operation, no fluid application, according to Wenzel, should be made to the eye. It should be simply covered with a dossil of lint; over which a dry compress should be applied. The dressings should in general be removed every day.

Mr. Ware, however, approves of fluid applications. He has found, that a dossil of lint, steeped in plain water, or brandy and water, and covered with the spermaceti, or saturnine cerate, and removed once every day, is the most easy and convenient dressing, that can be applied after the operation. The cerate over the lint prevents the latter, when impregnated with the discharge, from becoming stiff, and irritating the lids. Mr. Ware thinks the mode of applying the compress and bandage over the eye, a circumstance of no small importance, because, if too loose, the dressings are very apt to slip off, and, consequently, to press unequally and injuriously on the eye; and, if too tight, the undue pressure will excite pain and inflammation, and even force out some of the vitreous humour. Mr. Ware's compress is made of soft linen, folded, two or three times, wide enough to cover both eyes, and sufficiently long to extend from the upper part of the forehead to the lower part of the nose. This he pins at the top of the patient's nightcap; and its lower part, which is divided in the middle, to allow the nose to come through it, he lays loosely over the eyes. The bandage, also made of old linen, and as broad as six fingers, he carries round the head over the compress, and pins to the side of the nightcap moderately tight. A slip of linen is afterwards carried under the chin and pinned, at each end, to the side of the bandage, to prevent it from slipping upwards. (*Ware.*)

The patient should lie continually on his back, after the operation, as this posture has a tendency to prevent the escape of the humours.

Mr. Ware has published a very able enquiry into the causes preventing the success of extraction of the cataract.

The first, which he considers, is making the incision through the cornea too small. In this circumstance a degree of violence will be required to bring the cataract through the wound; and, if the cataract be not altered in its figure, the wound will be forcibly dilated, and the edge of the iris compressed between the cornea and the cataract. In this way, either some of its fibres may be ruptured,

or it may be otherwise so much injured, as to excite a considerable degree of inflammation, and even induce, in the end, a closure of the pupil.

This accident may arise from the operator's cutting the cornea, without being able to see exactly the position of this membrane, in consequence of the eye having turned inward, owing to its not being properly fixed. The fault may also proceed from the incision having been begun below the transverse diameter of the cornea. In this manner, nine-sixteenths, or rather more than half of the circumference of this membrane, will not be divided; which extent the incision ought always to occupy, in order to allow the cataract to be extracted with facility.

When the cornea is remarkably flat, and the iris projects unusually forward in the anterior chamber, however, Mr. Ware recommends including only one-third of the cornea in the first incision, and afterwards enlarging the aperture, on the outer side, by means of curved scissars.

Whenever the wound in the cornea is made too small, it should always be enlarged before proceeding further in the operation; and this can be best accomplished with a pair of curved blunt-pointed scissars, on the outer side of the cornea, where the knife first made its entrance.

Taking care to fix the eye in Mr. Ware's way, is certainly of great consequence in hindering the wound in the cornea from being made too small.

Wounding the iris with the cornea-knife, is the second accident, which Mr. Ware considers. The principal cause seems to him to be a discharge of the aqueous humour, before the knife has passed through the cornea low enough to hinder the lower part of the iris, which forms the inferior rim of the pupil, from getting beneath the edge of the instrument. The escape of the aqueous humour may be owing to some inaccuracy in the shape of the knife, or unsteadiness in introducing it. The falling of the lower part of the iris under the edge of the knife, Mr. Ware believes, cannot always be prevented by the utmost skill, or precaution of the operator. Happily, however, says he, we have been taught, that the iris may be reinstated, after it has been thus displaced, and without suffering any injury, by applying gentle frictions on the cornea, over the entangled part, with the point of the finger.

By unsteadiness in passing the knife, Mr. Ware means, that the knife may not only be suffered to make a punctuation through this tunic, but, that its edge may, at the same time, be unintentionally pressed downward, so as to make an incision likewise; in consequence of which downward motion of the knife, an aperture must unavoidably be left in the cornea, through which the aqueous humour will escape. If the cornea-knife increase through its whole length, both in width and thickness, and if it be merely pushed through the cornea, no space will be left, through which any fluid can escape.

The third accident, noticed by Mr. Ware, is the escape of the vitreous humour. The common occasion of this occurrence is the undue application of pressure. It may take place, either when the incision is made through the cornea, or at the time of extracting the cataract out of the eye. Some eyes are subject to spasm; which renders them much more liable to this accident. To prevent it, Mr. Ware recommends every kind and degree of pressure to be taken from the eye, before the knife has completely cut its way through the cornea. And, as soon as the knife has proceeded sufficiently low to secure the iris from being wounded, the operator should not only take heed, that his own fingers do not touch the eye, but should also direct the assistant, who supports the upper lid, to remove his fingers entirely from this part. The assistant seldom need make any pressure on the globe of the eye: however, when there is room for one of his fingers to be placed on the inner and upper part of the globe, without interfering with those of the operator, the method may be followed, in order to make the eye still more fixed. But immediately the punctuation of the cornea is completed, the assistant's finger should always be entirely removed, both from the eyelids and eye itself.

Notwithstanding the upper lid is left thus free, there will be sufficient space between it and the lower lid, to allow the progress of the knife to be seen; and, in finishing the wound, the operator should depress the lower lid with great gentleness.

The vitreous humour may also be lost, in consequence of opening the capsule of the lens nearer the circumference, than the centre of the pupil. As the crystalline is both thinner and softer at that part, the instrument will be liable to pass through both sides of the capsule, and enter the vitreous humour. This humour having no longer any barrier to its escape, is liable to be forced out by the action of the eyelids alone; and, when pressure is afterwards made, to bring the cataract through, a much greater quantity will be lost, and the cataract, instead of coming forward, will recede from the pupil. The only way to extract it now, is, by having the upper lid gently raised by an assistant, (a rare instance, in which this is necessary after cutting the cornea) while the operator, either with the fore-finger of the left hand, or with the blunt end of the curette, applied beneath the incision in the cornea, prevents the cataract from

sinking further. Then, with his right hand, let him introduce a hook under the flap of the cornea, and with its point carefully entangle the cataract, and bring it away.

To prevent, however, such difficulties, Mr. Ware very judiciously advises never attempting to puncture the capsule, until the whole pupil is in view. This gentleman is in the habit of opening the capsule with a gold-pointed needle, arched towards its extremity. Wenzel's needle, for this purpose, is flat at its extremity: Mr. Ware's is pointed: and this is their only difference. The latter introduces his instrument under the flap of the cornea, with its arched part uppermost, until its point is on a level with the centre of the pupil. The end of the instrument should then be turned inward, and gently rubbed on the capsule of the crystalline, until it pierces it. In a few instances, Mr. Ware has found the capsule so tough, that the point of the gold needle would not enter it, and he has been obliged to use a sharp steel instrument, of the same shape as the gold-pointed one.

The vitreous humour may also be lost, at the time of extracting the cataract, and the usual cause is an undue application of pressure. All violent pressure is quite unnecessary for forcing out the cataract, when the wound in the cornea is sufficiently large. When the wound is too small, it should be enlarged as above directed. If pressure be continued at all after the cataract is extracted, the capsule of the vitreous humour will certainly be ruptured, and some of this part of the eye protruded. Pressure may even rupture the capsule of the vitreous humour, before the cataract is brought through the incision in the cornea; and the same consequences will ensue, and the same practice be necessary, as in the case, in which the operator has unskilfully opened the capsule of the vitreous humour with the needle, in attempting to open that of the lens.

In taking away fragments of opaque matter, remaining behind, by means of the curette, great care is requisite to avoid wounding the posterior part of the capsule of the crystalline with the end of the instrument, so as to open a way for the escape of the vitreous humour.

The vitreous humour may, indeed, be forced out, after the extraction of the cataract, merely by a spasmodic action of the eyelids. On this subject, Mr. Ware, after hinting his suspicion, that, in a case of this kind, which he saw, the assistant's keeping up the lid contributed to the event, repeats his advice, "that the upper eyelid should be raised solely by the fingers of the left hand of the operator," after cutting the cornea.

Mr. Ware seems to think, that more evil has resulted from the operator's being deterred, by the readiness, with which the vitreous humour continues to start out, from ascertaining, that all the fragments of the cataract are removed, and that the whole of the iris has resumed its position, than from the mere loss of the vitreous humour, which is quickly regenerated.

Mr. Ware afterwards takes notice of the accident of extracting only a part of the cataract, and leaving the remainder behind. He is an advocate for removing all opaque substances from the pupil, except an extreme degree of irritability, to which some eyes are subject, should render the introduction of every sort of instrument, after the cataract is extracted, difficult and dangerous. Mr. Ware usually removes opaque portions of the cataract by means of a curette; and, occasionally, when the opaque substance has been large, and has adhered to the capsule, he has been obliged to extract it with small forceps. Before finishing the operation, Mr. Ware approves of always rubbing the end of the finger gently on the fore part of the eye, over the eyelids; which proceeding tends to bring in view any opaque matter, which may previously lie behind the iris. Mr. Ware relates a case, proving, that such opacities as cannot be removed in the operation, are capable of being absorbed.

This gentleman says, that an opacity of the capsule can be the only reason for removing it. The anterior part, also, can alone become the object of the operator's attention: its posterior part is necessarily hidden, while the cataract remains in the eye, and afterwards, if discovered to be opaque, it is so closely connected with the capsule of the vitreous humour, that Mr. Ware believes it cannot be removed by any instrument, without hazarding a destructive effusion of this humour.

When, however, the opaque lens, is accompanied with an opacity in the front part of the capsule, Mr. Ware recommends the following plan. After cutting the cornea, as usual, a fine-pointed instrument, somewhat smaller in size than a round couching needle, and a little bent towards the point, should be introduced under the flap of the cornea, with its bent part upward, until its point is parallel with the aperture of the pupil. The point should then be turned toward the opaque capsule, which is to be punctured by it, in a circular direction, as near to the rim of the pupil as the instrument can be applied, without hurting the iris. Sometimes, the part included within the punctures, may be extracted on the point of the instrument; and, if this cannot be done, it should be removed with a small pair of forceps. The lens, whether opaque,

or transparent, should next be extracted, by making a slight pressure with the curette, either above, or below, the circumference of the cornea.

Mr. Ware afterwards considers the bad consequences of allowing foreign bodies of any kind, after the operation, to press unequally on the globe of the eye; comprehending, under this head, the intervention of the edge of the lower eyelid between the sides of the divided cornea; the inversion of the edge of the lower eyelid; and the lodgment of one, or more, loose eyelashes on the globe of the eye.

To prevent the first accident, every operator, before applying the dressings, should carefully depress the lower eye-lid; and, before he suffers the lid to rise, should take care, that the flap of the cornea be accurately adjusted in its proper position; and, that the upper lid be dropped, so as completely to cover it. After this, the eyelids should not be opened again, for three, or four days, that is, until there is good reason to suppose the wound in the cornea closed. (*Ware.*)

The inversion of the lower eyelid is hurtful, in consequence of its making the eyelashes rub against the eye. These should be extracted the day before the operation. For the mode of effecting a permanent cure, see *Trichiasis.*

Besides the danger, to which the eye is exposed, from the inversion of the edge of the lid, the eye may receive injury from the improper position of the eyelashes alone; one, or more of which, during the operation, may happen to bend inwards; or, becoming loose, may afterwards insinuate themselves between the inside of the lid and the eye. An eyelash bent inward, should be rectified; if broken off and loose, it should be removed, before dressing the part.

Mr. Ware lastly considers prematurely exposing the eye to a strong light. He censures the plan of opening the eyelids, within the first two or three days after the operation, because the stimulus of the light increases the ophthalmy, and the method is apt to disturb the wound in the cornea, before it is closed. Mr. Ware, however, wishes it not to be inferred, that he is an advocate for long confinement after the operation. His mode is to keep the patient wholly in bed, and to direct him to move his head, as little as possible, for the first three days after the operation, During this time, a dossil of wet lint is kept on his eyes, covered with a saturnine plaster, compress, and bandage, as already described. The dressing is renewed once every day, and the outsides of the eyelids washed with warm water in winter, and cold in summer. At each time of dressing, the skin of the lower lid is drawn gently down to prevent any tendency to an inversion. Animal food is prohibited, and the patient enjoined not to talk much. On the fourth day, he is permitted to sit up, for two, or three hours, and, if he has had no stool since the operation, a mild opening medicine is now administered. On the fifth, the time of his sitting up is lengthened, and, presuming that the wound in the cornea is now closed, Mr. Ware usually examines the state of the eye. After this, no dressings need be applied in the day-time, care being taken to defend it from a strong light, by a pasteboard hood, or shade, and by darkening the room, so that no inconvenience is felt. The patient may now also look, for a short time, at large objects. The following part of the treatment need interfere very little with the wishes of the patient, unless unexpected accidents should occur. (*Ware.*)

OF COUCHING, OR DEPRESSION OF THE CATARACT.

This operation consists in removing the opaque lens out of the axis of vision, by means of a needle, constructed for the purpose.

There are two couching needles, which now seem to be preferred to all others: and these are the only ones requiring a description here. I allude to the one used by Mr. Hey; and to that employed by Professor Scarpa.

The length of Mr. Hey's needle is somewhat less than an inch. It would be sufficiently long if it did not exceed seven-eighths of an inch. It is round, except near the point, where it is made flat by grinding two opposite sides. The flat part is ground gradually thinner to the extremity of the needle, which is semicircular, and ought to be made as sharp as a lancet. The flat part extends in length, about an eighth of an inch, and its sides are parallel. From the part where the needle ceases to be flat, its diameter gradually increases towards the handle. The flat part is one-fortieth of an inch in diameter. The part which is nearest the handle, is one-twentieth of an inch. The handle, which is three inches and a half in length, is made of light wood, stained black. It is octagonal, and has a little ivory inlaid in the two sides, which correspond with the edge of the needle.

Mr. Hey describes the recommendations of this instrument in the following terms:

1. "It is only half the length of the common needle; and this gives the operator a greater command over the motions of its point, in removing the crystalline from its bed, and tearing its capsule. It is also of some consequence, that the operator should know how far the point of his needle has penetrated the globe of the

eye, before he has an opportunity of seeing it through the pupil; as it ought to be brought forwards when it has reached the axis of the pupil. Now he may undoubtedly form a better judgment respecting this circumstance, when the length of his needle does not much exceed the diameter of the eye, than when he uses one of the ordinary length, which is nearly two inches. The shortness of the needle is peculiarly useful, when the capsule is so opaque that the point cannot be seen through the pupil.

2. "As this needle becomes gradually thicker towards the handle, it will remain fixed in that part of the sclerotis, to which the operator has pushed it, while he employs its point in depressing and removing the cataract. But the spear-shaped needle, by making a wound larger in diameter, than that part of the instrument, which remains in the sclerotis, becomes unsteady, and is with difficulty prevented from sliding forwards against the ciliary processes, while the operator is giving it those motions which are necessary for depressing the cataract.

"On the same account the common spear-shaped needle may suffer some of the vitreous humour to escape during the operation, whereby the iris and ciliary processes would be somewhat displaced, and rendered flaccid; whereas the needle which I use, making but a small aperture in the sclerotis, and filling up that aperture completely during the operation, no portion of the vitreous humour can flow out so as to render the iris and ciliary processes flaccid.

3. "This needle has no projecting edges: but the spear-shaped needle, having two sharp edges, which grow gradually broader to a certain distance from its point, will be liable to wound the iris, if it be introduced too near the ciliary ligament, with its edges in a horizontal position. I have been informed, that, in an operation performed by one of the most eminent surgeons in the metropolis, now deceased, the iris was divided as far as the pupil. If the operator, in order to avoid this danger, introduces his needle with its edges in a vertical position, he will divide the fibres of the sclerotis transversely, and, by thus enlarging the wound, will increase the unsteadiness of the instrument. Besides, however the needle be introduced, one of its sharp edges must be turned toward the iris in the act of depressing the cataract; and, in the various motions which are often necessary in this operation, the ciliary processes are certainly exposed to more danger, than when a needle is used which has no projecting edge.

4 "It has no projecting point. In the use of the spear-shaped needle, the operator's intention is to bring its broadest part over the centre of the crystalline. In attempting to do this, there is great danger of carrying the point beyond the circumference of the crystalline, and catching hold of the ciliary processes, or their investing membrane, the *membrana nigra*. This accident is the more probable, as the point of the needle must unavoidably be directed obliquely forwards, and this motion, if carried too far, brings the point into contact with the ciliary processes, as they surround the capsule of the crystalline.

"A needle, made according to the figure given in the annexed plate, will pass through the sclerotis with ease. It will depress a firm cataract readily, and break down the texture of one that is soft. If the operator finds it of use to bring the point of the needle into the anterior chamber of the eye (which is often the case), he may do this with the greatest safety, for the edges of the needle will not wound the iris. In short, if the operator, in the use of this needle, does but attend properly to the motion of its point, he will do no unavoidable injury to the eye, and this caution becomes the less embarrassing, as the point does not project beyond that part of the needle by which the depression is made, the extreme part of the needle being used for this purpose." (*Hey.*)

Scarpa employs a very slender needle, possessing sufficient firmness to enter the eye without hazard of breaking, and having a point, which is slightly curved. The curved extremity of the needle is flat upon its dorsum, or convexity, sharp at its edges, and has a concavity, constructed with two oblique surfaces, forming in the middle a gentle eminence, that is continued along to the very point of the instrument; there is a mark on the side of the handle, which corresponds to the convexity of the point. The surgeons of the Leeds Infirmary have had one advantage in the needle, which they have used in imitation of Baron Hilmer; I mean, having it made of no greater length than the purposes of the operation demand. A couching needle is sufficiently long when it does not exceed, at most, an inch in length: this affords the operator a greater command over the motions of the point, and enables him to judge more accurately, how far it has penetrated the globe of the eye, before he has an opportunity of seeing it through the pupil. To the needle, therefore, so much recommended by Scarpa, and so successfully used by him, and Doctor Morigi, principal surgeon of the hospital at Piacenza, and one of the most expert operators of the present day in Italy, it seems proper to unite the improvement of having it made no longer than is necessary. The needle here described, will penetrate the

sclerotic coat as readily as any straight one, of the same diameter, and, by reason of its slenderness, will impair the internal structure of the eye less in its movements than common couching needles. When cautiously pushed in a transverse direction, till its point has reached the upper part of the opaque lens, it becomes situated with its convexity towards the iris, and its point in an opposite direction; and, upon the least pressure being made by its convex surface, it removes the cataract a little downward, by which a space is afforded at the upper part of the pupil, between the cataract and ciliary processes, through which the instrument may be safely conveyed in front of the opaque body and its capsule, which it is prudent to lacerate in the operation. In cases of caseous, milky, and membranous cataracts, the soft pulp of the crystalline may be most readily divided, and broken piecemeal by the edges of its curved extremity; and the front layer of the capsule lacerated into numerous membranous flakes, which, by turning the point of the instrument towards the pupil, may be as easily pushed through this aperture into the anterior chamber, where Scarpa finds absorption takes place more quickly, than behind the pupil.

In ordinary cases, there is not the least occasion for any preparatory treatment previous to the operation; all that prudence requires is, that the patient should abstain from animal food, and fermented liquors, for a few days before submitting to it, and should take one dose of a gentle purgative. But this, like every other general observation, is liable to particular exceptions. Hypochondriacal men, hysterical women, and patients subject to affections of the stomach and nervous system, should take, for two or three weeks before the operation, tonic bitter medicines, particularly the infusion of quassia, either with, or without a few drops of the æther vitriolicum to each dose; or, in other cases, ʒj of Peruvian bark, with ℈j of valerian, may be administered two or three times a day with particular benefit. It is observed by the most accurate writers upon this subject, that in such persons the symptoms consequent to operations upon the eyes, are often much more violent than in common cases; and it therefore seems proper to endeavour, previously, to meliorate their constitutions. When the patient is timid, it is very advisable to give him, half an hour before the time of operating, about fifteen drops of the *tinctura opii*, with a little wine.

Some patients, besides being afflicted with cataracts, have the edges of the eyelids swollen and gummy, with relaxation, and chronic redness of the conjunctiva. In this case, before undertaking to couch, it is advisable to apply a blister to the nape of the neck, and to keep it open for two or three weeks, by means of the Savin cerate, and to insinuate every morning and evening, between the palpebræ and globe of the eye, a small quantity of the unguentum hydrarg. nitrat. mitius, prepared according to the pharmacopœia of St. Bartholomew's Hospital, increasing its strength gradually. (℞. Unguenti hydrargyri nitrati, ʒiv. Adipis Suillæ ʒviij. Olei Olivæ, ʒij.) In obstinate cases, when this ointment does not produce the desired effect, an ointment recommended by Janin, (Memoires sur l'Oeil.) should be substituted: it consists of ʒss of hogslard, ʒij of prepared tutty, ʒij of armenian bole, and ʒj of the white calx of quicksilver. At first, care should be taken to use it lowered, with twice or thrice its quantity of lard. In the daytime, a collyrium, composed of ʒiv of rosewater, ʒss of the mucilage of quince seeds, and gr. v of the sulphate of zinc, may also be frequently used with considerable advantage. By such means the morbid secretion from the Meibomian glands, and membranous lining of the eye-lids, will be checked, and the due action of the vessels, and natural flexibility of the eye-lids, will be restored. (*Saggio di Osservazioni, &c. sulle principali malattie degli occhi. Venez.* 1802.)

FIRM CATARACT.

In the operation, the patient should be seated rather low, opposite a window where the light is not vivid, and in such a manner that the rays may fall laterally upon the eye about to be couched. The other eye, whether in a healthy or diseased state, ought always to be closed, and covered with a handkerchief, or any thing convenient for the purpose; for, so strong is the sympathy between the two organs, that the motions of the one constantly produce a disturbance of the other. The surgeon should sit upon a seat rather higher than that upon which the patient is placed; and, to give his hand a greater degree of steadiness in the various manœuvres of couching, he will find it useful to place his elbow upon his knee, which must be sufficiently raised for this purpose, by a stool placed under the foot. The chair, on which the patient sits, ought to have a high back, against which his head may be so firmly supported, that he cannot draw it backward during the operation. The back of the chair must not slope backward, as that of a common one, but be quite perpendicular, in order that the patient's

head may not be too distant from the surgeon's breast. (*Richter's Anfansgrunde der Wundarzneykunst, P.* 207. 3 *Band.*)

The propriety of supporting the patient's head rather upon the back of the chair, on which he sits, than upon an assistant's breast, must immediately strike every impartial mind; for, as Bischoff has observed, the least motion of the assistant, even that necessarily occasioned by respiration, causes, also, a synchronous motion of the part, supported on his breast, which cannot fail to be disadvantageous, both in the operation of extraction, and of couching. Hence Callisen and Richter have recommended the same method of supporting the patient's head, as I have here submitted to public consideration.

In certain cases, where the muscles of the eye, and eyelids, are incessantly affected with spasm; or, where the eye is peculiarly diminutive, and sunk, as it were, in the orbit, the elevator for the upper eyelid, invented by Pellier, and approved by Scarpa, may possibly prove servicable; in operating upon young subjects, I think it might contribute much to facilitate the operation.

The couching needle (if the curved one) is to be held with the convexity of its curvature forward; its point backward; and its handle parallel to the patient's temple. The surgeon having directed the patient to turn the eye towards the nose, is to introduce the instrument boldly through the sclerotic coat, at the distance of not less than two lines from the margin of the cornea, for fear of injuring the ciliary processes. Most authors advise the puncture to be made at about one line, and some even at the minute distance of 1-16th of an inch (*Hey*) from the union of the cornea with the sclerotica; but, as the ciliary processes ought invariably to be avoided, and there is no real cause to dread wounding the aponeurosis of the abductor muscle, as some have conceived, the propriety of puncturing the globe of the eye, at the distance of two lines, or two and a half, from the margin of the cornea, as advised by Petit, Platner, Bertrandi, &c. must, in all cases, be sufficiently manifest.

Nor is it a matter of indifference, at what height the needle is introduced, if it be desirable to avoid, as much as possible, effusion of blood in the operation. Anatomy reveals to us, that the long ciliary artery pursues its course to the iris, along the middle of the external convexity of the eyeball, between the sclerotic and choroid coats; and hence, in order to avoid this vessel, it is prudent to introduce the instrument about one line below the transverse diameter of the pupil, as Dudell, Guntz, Bertrandi, Scarpa, &c. have directed. If the couching needle were introduced higher than the track of the long ciliary artery, it would be inconvenient for the depression of the cataract.

The exact place, where the point of the needle should next be guided, is, no doubt, between the cataract and ciliary processes, in front of the opaque lens, and its capsule: but, as I conceive, the attempt to hit this delicate invisible mark, borders upon impossibility, and, with a straight pointed needle, might even endanger the iris, I cannot refrain from expressing my dissent to the common method of passing a couching needle at once in front of the cataract. On the contrary, it seems safer to direct the extremity of the instrument immediately over the opaque lens, and, in the first instance, to depress it a little downward, by means of the convex flat surface of the end of the needle, in order to make room for the safe conveyance of the instrument, between the cataract and corpus ciliare, in front of the diseased crystalline and its capsule; taking care, in this latter step of the operation, to keep the marked side of the handle forward, by which means the point of the needle will be in an opposite direction to the iris, and will come into contact with the diseased body, and the membrane binding it down in the fossula of the vitreous humour. Having done this (supposing it to be a firm cataract), the instrument will be visible through the pupil; and now we are to push its point transversely, as near as possible the margin of the lens, on the side next the internal angle of the eye, taking strict care to keep it continually turned backward. The operator is then to incline the handle of the instrument towards himself, by which its point will be directed through the capsule, into the substance of the opaque lens; and, on making a movement of the needle, describing the segment of a circle, at the same instant inclining it downward and backward, he will lacerate the former, and convey it, in the generality of cases, with the latter, deeply into the vitreous humour.

It happened, unfortunately for the credit of the operation of depression, that M. Petit admonished surgeons to beware of wounding the anterior layer of the crystalline capsule: he had an idea, that, in observing this caution, the vitreous humour would afterwards fill up the space, previously occupied by the lens, and that thus the refracting powers of the eye might become as strong as in the natural state, and the necessity for using spectacles might thereby be considerably obviated. But, we are now apprized, that leaving this very membrane, from which M. Petit anticipated such great

utility, even were it practicable to leave it constantly uninjured in its natural situation, would be one of the worst inculcations that could possibly be promulgated; for, in many cases, where extraction proves fruitless, in some, where depression fails, the want of success is owing to a subsequent opacity of the crystalline capsule; in short, blindness is reproduced by the secondary membranous cataract. It seems more than probable, that in some of the instances, where the opaque lens has been said to have risen again, nothing more has happened, than the disease in question. Therefore, notwithstanding the whole capsule may be, in the majority of cases, depressed with the lens out of the axis of vision, as it is not a constant occurrence, I cannot too strongly enforce the propriety of extirpating, as it were, every source and seat of the cataract in the same operation, and, in imitation of the celebrated Scarpa, the only one who, as far as my information reaches, has put sufficient stress upon this practice, I shall presume to recommend, as a general rule in couching, always to lacerate the front layer of the capsule, whether in an opaque or transparent state.

The capsule of the crystalline lens may retain its usual transparency, while the lens itself is in an opaque state. In this case, an inexperienced operator might, from the blackness of the pupil, suppose, not only that he had removed the lens, but also the capsule from the axis of sight; and, having depressed the cataract, he might unintentionally leave this membrane entire in its natural situation. Therefore, if there should be any reason for suspecting, that the anterior layer of the capsule has escaped laceration; if, in other words, the resistance made to moving the convexity of the instrument forward, towards the pupil, should give rise to such a suspicion; for the sake of removing all doubt, it is proper to communicate to the needle a gentle rotatory motion, by which its point will be turned forward, and disengaged, through the transparent capsule, opposite the pupil: then, by repeating a few movements downward and backward, it will be so freely rent with the needle, as to occasion no future trouble.

FLUID, OR MILKY CATARACT.

When the case is of this description, the operator frequently finds, that, on passing the point of the couching needle through the anterior layer of the capsule, its white milky contents instantly flow out, and, spreading like a cloud over the two chambers of the aqueous humour, completely conceal the pupil, the iris, and the instrument, from his view; who, however, ought never to be discouraged at this event. In the *Critical Reflections on the Cataract*, I have dissented from continuing the operation, when, in its commencement, blood is effused into the aqueous humour; I have there adverted to the effusion of the milky matter of cataracts, into the same situation; and, I have said, that the two cases are not to be considered in a different light; but, I only alluded to the consequences of these occurrences. I shall now take the opportunity to observe, that, although it seems to me most prudent, to postpone the completion of the operation, in the example of blood concealing the pupil, in the first step of couching, and not to renew it, before the aqueous humour has recovered its transparency; yet, I am inclined to adopt this sentiment, chiefly because the species of cataract is, in this circumstance, quite unknown to the operator, consequently he must be absolutely incapable of employing that method of couching, which the peculiarities of the case may demand. It is very different when a milky fluid blends itself with the aqueous humour, and prevents the surgeon from seeing the iris and pupil: this event is itself a source of information to him, inasmuch as it gives him a perfect insight into the nature of the cataract, which he is treating; and instructs him what method of operating it is his duty to adopt. The surgeon, guided by his anatomical knowledge of the eye, should make the curved point of the needle describe the segment of a circle, from the inner, toward the outer canthus, and in a direction backward, as if he had to depress a firm cataract. (*Scarpa*). Thus he will succeed in lacerating, as much as is necessary, the anterior layer of the capsule, upon which, in a great measure, the perfect success of the operation depends; and, not only in the milky, but almost every other species of cataract.

In regard to the extravasation of the milky fluid, into the two chambers of the aqueous humour, numerous observations, from the most creditable authorities, prove, that it spontaneously disappears, very soon after the operation, and leaves the pupil of its accustomed transparency. "In twelve cases of a dissolved lens, on which I have operated," says Latta, "the dissolution was so complete, that, on entering the needle into the capsule of the lens, the whole was mixed with the aqueous humour, and all that could be done, was to destroy the capsule as completely as possible, that all the milky matter might be evacuated. In ten of these cases, vision was almost completely restored in four weeks from the opera-

tion." Mr. Pott, in treating of this circumstance, viz. the effusion of the fluid contents of the capsule into the aqueous humour, observes, that so far from being an unlucky one, and preventive of success, it proves on the contrary, productive of all the benefit which can be derived from the most successful depression or extraction, as he has often and often seen. But as this point is, I believe, no longer made an objection to couching, it would be superfluous to enlarge, in confirmation of what has been stated concerning it.

SOFT, OR CASEOUS CATARACT.

When the cataract is of a soft, or caseous description, the particles of which it is composed, will frequently elude all efforts made with the needle to depress them, and will continue behind the pupil in the axis of vision. This has been adduced as one instance that baffles the efficacy of couching, and may really seem, to the inexperienced, an unfortunate circumstance. It often happens that, in the operation of extraction, fragments of opaque matter are unavoidably overlooked and left behind; yet Richter, who once so strenuously signalised himself in favour of the new operation, confesses, that such matter is removed by the absorbents. Supposing a caseous cataract should not have been sufficiently broken, and disturbed in the first operation, and that, consequently, the absorbents do not completely remove it, such a state may possibly require a re-application of the instrument; but this does not generally occur, and is the worst that can happen. It is quite impossible to determine *a priori*, what effect will result from the most trivial disturbance of a cataract; its entire absorption may, in some instances, follow, while in others, a repetition of an operation becomes necessary for the restoration of sight. Even where the whole firm lens has re-ascended behind the pupil, as Latta and Hey confirm, the absorbents have superseded the necessity for couching again. The disappearance of the opaque particles of cataracts was, in all times, and in all ages, a fact of such conspicuity, that, as appears from the authorities already quoted, it was recorded, even previous to the discovery of the system of lymphatic vessels in the body. Indeed the modern observations of Scarpa, and others, so strongly corroborate the account which I have given, of the vigorous action of the absorbents, in the two chambers of the aqueous humour; and, particularly, in the anterior one, that, from the moment the case is discovered to be a soft, or caseous cataract, it seems quite unnecessary to make any further attempt to depress it into the vitreous humour. Mr. Pott sometimes, in this circumstance, made no attempt of this kind, but contented himself with a free laceration of the capsule, and, after turning the needle round and round, between his finger and thumb, within the body of the crystalline, left all the parts in their natural situation, where he hardly ever knew them fail of dissolving so entirely, as not to leave the smallest vestige of a cataract. This eminent surgeon even practised occasionally what Scarpa so strongly inculcates at this day; he even pushed the firm part of such cataracts through the pupil into the anterior chamber, where it always disappeared, without producing the least inconvenience: we must, at the same time add, that he thought this method wrong, not on account of its inefficacy, but an apprehension that it would be apt to produce an irregularity of the pupil, one of the worst inconveniences attending the operation of extraction. But the deformity of the pupil, after extraction, seems to proceed either from an actual laceration of the iris, or a forcible distention of the pupil, by the passage of large cataracts through it, a kind of cause that would not be present in pushing the broken portions of a caseous lens into the anterior chamber; therefore, it does not seem warrantable to reject this very efficacious plan of treatment, for which the curved pointed needle is, undoubtedly, the best calculated. It is very deserving of notice, that Mr. Hey, who has several times seen the whole opaque nucleus and very frequently small opaque portions fall into the anterior chamber, makes this remark: "Indeed, if the cataract could, in all cases, be brought into the anterior chamber of the eye, without injury to the iris, *it would be the best method of performing the operation.*" What the same author also observes in the subsequent part of his work, is strikingly corroborative of the efficacy of Scarpa's practice. The practice of the Italian professor consists in lacerating the anterior portion of the crystalline capsule, to the extent of the diameter of the pupil, in a moderately dilated state; in breaking the pappy substance of the diseased lens piecemeal; and in pushing the fragments through the pupil, into the anterior chamber, where they are gradually absorbed.

MEMBRANOUS CATARACT.

One great advantage in favour of couching, depends upon its generally removing the capsule, at the same time with the lens, from the passage of the rays of light to the retina. Sometimes, however, this

desirable event, by which the patient is extricated from the danger of a secondary membranous cataract, does not take place even in the operation of depression; and, when the lens included in its capsule is extracted from the eye, by the other method, it may always be considered as rather an uncommon circumstance. What most frequently constitutes the secondary membranous cataract, is the anterior half of the capsule, which not having been removed, or sufficiently broken, in a previous operation, continues more or less entire in its natural situation, afterwards becomes opaque, and thus impedes the free transmission of the rays of light to the seat of vision. Sometimes the secondary membranous cataract presents itself beyond the pupil, in the form of membranous flakes, apparently floating in the aqueous humour, and shutting up the pupil: at other times it appears in the form of triangular membranes, with their bases affixed to the *Membrana Hyaloidea*, and their points directed towards the centre of the pupil. When there is only a minute membranous flake suspended in the posterior chamber, it is on no account necessary for the patient to submit to another operation; vision is tolerably perfect, and the small particle of opaque matter will, in time, spontaneously disappear. But when the secondary membranous cataract consists of a collection of opaque fragments of the capsule, accumulated so as either in a great degree or entirely to close the pupil; or when the disease consists of the whole anterior half of the opaque capsule, neglected in a prior operation, and continuing adherent in its natural situation, it is indispensable to repeat an operation; for, although in the first case, there may be good reason to hope that the collection of membranous fragments might, in time, disappear, yet it would be unjustifiable to detain the patient for weeks and months in a state of anxiety and blindness, when a safe and simple operation would restore him, in a very short space of time, to the enjoyment of this most useful of the senses. In the second case, it is absolutely indispensable: for while the capsule remains adherent to its natural connections, the opacity seldom disappears, and may even expand itself over a larger portion of the pupil. The operation should be performed as follows: when the aperture in the iris is obstructed by a collection of membranous flakes, detached from the membrana hyaloidea, the curved needle should be introduced, with the usual precaution of keeping its convexity forward, its point backward, until arrived behind the mass of opaque matter; the surgeon is then to turn the point of the needle towards the pupil, and is to push through this opening, regularly one after another, all the opaque particles into the anterior chamber, where, as we have before noticed, absorption seems to be carried on more vigorously than behind the pupil. All endeavours to depress them into the vitreous humour, Scarpa has found to be vain; for scarcely is the couching needle withdrawn when they all re-appear at the pupil, as if, (to use his own phrase) carried thither by a current: but when forced into the anterior chamber, besides being incapable of blocking up the pupil, they lie, without inconvenience, at the bottom of that cavity, and in a few weeks are entirely absorbed.

When the secondary membranous cataract consists of the whole anterior layer of the crystalline capsule, or of several portions of it connected with the membrana hyaloidea, the surgeon, after cautiously turning the point of the needle towards the pupil, is to pierce the opaque capsule; or, should there be any interspace, he is to pass the point of the instrument through it; then, having turned it again backward, he is to convey it, as near as possible, to the attachment of the membranous cataract, and after piercing the capsule, or each portion of it successively, and sometimes carefully rolling the handle of the instrument between his finger and thumb, so as to twist the capsule round its extremity, he will thus break the cataract, as far as it is practicable, at every point of its circumference. The portions of membrane, by this means separated from their adhesions, are next to be cautiously pushed, with the point of the couching needle turned forward, through the pupil, into the anterior chamber. In these manœuvres the operator must use the utmost caution not to injure the iris, and ciliary processes, for, upon this circumstance depends having no bad symptoms after the operation, notwithstanding its duration may have been long, and the necessary movements of the needle numerously reiterated. If a part of the membranous cataract should be found adherent to the iris, (a complication, that will be indicated when, upon moving it backward or downward with the needle, the pupil alters its shape, and, from being circular becomes of an oval, or irregular figure), even more caution is required than in the foregoing case, so as to make repeated, but delicate movements of the needle, to separate the membranous opacity, without injuring the iris.

Nor will it be necessary to vary the plan of operating already explained, if occasionally the cataract should be formed of the posterior layer of the capsule.

The same plan also succeeds in those

rare instances where the substance itself of the crystalline wastes, and is almost completely absorbed, leaving the capsule opaque, and including, at most, only a small nucleus, not larger than a pin's head. Scarpa terms it the *Primary Membranous Cataract*; he describes it as being met with in children, or young people under the age of twenty; as being characterized by a certain transparency, and similitude to a cobweb; by a whitish opaque point, either at its centre or circumference; and, by a streaked and reticulated appearance: he adds, that whosoever attempts to depress such a cataract is baffled, as it re-appears behind the pupil soon after the operation; he recommends breaking it freely with the curved extremity of the couching needle, and pushing its fragments into the anterior chamber, where they are gradually absorbed in the course of about three weeks.

No other topical application is generally requisite, after the operation, than a small compress of fine linen; the patient ought to be kept in a quiet, dark room, and in bed. A dose of some mild purgative salt, such as the natron vitriolatum; magnesia vitriolata; soda phosphorata, &c. may usually be administered, with advantage, on the following morning. I shall not enlarge upon the method of treatment, when the inflammation, subsequent to couching, exceeds the ordinary bounds; in hypochondriacal, hysterical, and irritable constitutions, this is more frequently met with, and I have already touched upon the propriety of some preparatory measures, before couching these unfavourable subjects.

I cannot help remarking how judicious it is never to attempt too much at one time of couching. It happens in this, as in most other branches of operative surgery, that celerity is too often mistaken for skill: the operator should not only be slow and deliberate in achieving his purpose; he should be taught to consider, that a repetition of couching may, like the puncture of a vein, be safely and advantageously put into practice again and again; and with far greater security than if, for the sake of appearing expeditious, or avoiding the temporary semblance of failure, a bolder use of the couching needle should be made, than the delicate structure of the eye warrants. We read, in Mr. Hey's *Practical Observations on Surgery*, that he couched one eye seven times, before perfect success was obtained; had he been less heedful, and endeavoured to effect by one or two rough applications of the instrument, what he achieved by seven efforts of a gentler description, it is highly probable that the structure of the eye would have been so impaired, as well as the consequent ophthalmy so violent, as to have utterly prevented the restoration of sight.

OF THE CONGENITAL CATARACT, AND OPERATING UPON CHILDREN.

So much has been already said in a preceding section of this article, concerning the propriety and striking advantages of operating for the cataracts of children, that, to expatiate further upon this point, would be a mere waste of time.

We have noticed the case, which Scarpa terms the *primary membranous cataract*, and which is mentioned by that distinguished professor, as being met with in children, or young people, under the age of twenty, the substance of the crystalline itself being almost entirely absorbed, while the capsule is left in an opaque state, including, at most, only a small nucleus, not larger than a pin's head. This disease is described by Scarpa as being exceedingly rare, and characterised by a certain transparency, and similitude to a cobweb; by a whitish opaque point, either at its centre, or circumference; and by a streaked and reticulated appearance. Now, this example, which is represented by Scarpa, as being rare, appears, from the experience of Mr. Saunders, to be by no means uncommon, since, at the London Infirmary for curing diseases of the eye, it has been found that the majority of congenital cataracts were capsular, or membranous. This last statement is also at variance with that of the late Mr. Gibson, who has asserted, that, in infants, the cataract is generally fluid. (*Edinb. Med. and Surgical Journal, Vol. 7, p.* 397.) Mr. Ware also asserts, that, in children, born with cataracts, the crystalline humour has generally, if not always, been found either in a soft, or fluid state. (*Observ. on the Cataract and Gutta Serena, Vol. 2, p.* 380.) However, as Mr. Saunders must have had the most experience in these particular cases, I believe, we must consider his account as the most accurate. We learn from this last gentleman's publication, that, in the congenital cataract, after the crystalline lens is converted into an opaque substance, it is gradually absorbed; and, in proportion to the progress of absorption, the anterior lamella of the capsule approaches the posterior, until they form one membrane, which is white, opaque, and very elastic. This process is commonly completed long before the eighth year, and the operator will now find a substance, which he will in vain endeavour either to extract, or depress. But, there is one form of the congenital cataract, in which the absorption of the lens does not proceed, viz. when the cen-

tre of the crystalline is opaque, and its circumference is perfectly transparent. Should the capsule and lens be penetrated, however, with any instrument, the opacity soon becomes complete, and from this moment, the substance of the lens begins to be absorbed.

The experience of Mr. Saunders proves, that, in the congenital cataract, the lens may be either solid, soft, or fluid, but, that more frequently it is partially, or completely absorbed, and the cataract is capsular.

The following table of forty-four cases is given in Mr. Saunders's work, for the purpose of shewing in what proportion, each species of cataract has been found to prevail in congenital cases.

Solid opaque lens, with or without opacity of the capsule. Three single, two double cataracts - - - - -	5
Solid lens, opaque in the centre, transparent in the circumference, with capsule in the same state. Five double - - -	5
Soft opaque lens, with, or without opacity of the capsule. Two single, two double - - - - - -	4
Soft opaque lens, with solid nucleus. One single, two double -	3
Soft opaque lens, with dotted capsule, the spots white, the spaces transparent. Two double - - - - -	2
Fluid cataract, with opacity of the capsule. Two single - -	2
Fluid cataract, with opacity of the capsule, and closed pupil. Two double - - - - - - - -	2
Opaque and thickened capsule, the lens being completely absorbed, or the remains of it being thin and squamose. Six single, twelve double - - - - - - - -	18
Opaque and thickened capsule, with only a very small nucleus of the lens unabsorbed in the centre. Two single - - -	2
Opaque and thickened capsule in the centre, remains of the lens in the circumference. One double - - - - -	1

Here the corresponding character of congenital cataracts in the eyes of each individual is exhibited by the number of double cases, and, we are informed, that the same character was preserved in the cataracts of several children of the same family. (*Saunders on Diseases of the Eye, Edit. by Dr. Farre, p.* 135, 136.)

The congenital cataract appears frequently to afflict several children of the same parents. In the course of the present article, I have already had occasion to advert to two striking examples of this fact. The first is related by Mr. Lucas, who attended five children of a clergyman at Leaven, near Beverley, all born with cataracts. (See *Med. Obs. and Inquiries, Vol.* 6.) The second is mentioned by Mr. Gibson, who, some years ago, saw five, or six children, the families of two sisters, who were all totally blind, and in an idiotic state, having cataracts accompanied with amaurosis. (*Edinb. Med. and Surgical Journal, Vol.* 8, *p.* 398.) Several instances occurred to the late Mr. Saunders. In one family, two brothers were thus afflicted. In a second family, two brothers, twins, became blind with cataracts at the age of twenty-one months, each within a few days of the other. It is remarkable, that the four cataracts had precisely the same character. In a third family, a brother and two sisters were born with this disease. The eldest sister was affected with it only in one eye, the brother and youngest sister in both eyes. In a fourth family, three brothers and a sister had all congenital cataracts. (*Saunders on the Diseases of the Eye, p.* 134, 135.)

Children with congenital cataracts possess various degrees of vision; but, when they are totally blind, their eyes not being attracted by external objects, volition is not exercised over the muscles of these organs, which roll about with an irregular, rapid, and trembling motion.

I shall now proceed to speak of the manner of operating upon children. Until the time of Mr. Pott, the intention of surgeons, in couching, or depressing the cataract, (as indeed the expression itself implies) was to push the opaque crystalline downward, away from the pupil. Mr. Pott, conscious that the cataract often existed in a fluid, or soft state, was aware that it could not then be depressed; and, therefore, in such cases, he recommended using the couching needle for the express purpose of breaking down the cataract, and of making a

large aperture in the capsule, so that the aqueous humour, which he believed to be a solvent for the opaque crystalline, might come into immediate contact with this body. This operation, since the time of Mr. Pott, has been strongly and ably recommended by Mr. Hey, of Leeds, and Professor Scarpa, of Pavia. In the cases of children, it has even received the approbation of Mr. Ware, who informs us that he and his son have performed a similar operation on a considerable number of infants and young persons with uniform success. (*On the Operation of Puncturing the Capsule of the Crystalline Humour*, p. 9.)

But, notwithstanding the utility and efficacy of lacerating the front layer of the crystalline capsule had been so much insisted upon by Scarpa and others, their observations were confined to the cataract in the adult subject, and, before the example set by the late Mr. Saunders, no one, (excepting, perhaps, Mr. Gibson of Manchester) ventured to apply, as a regular and successful practice, such an operation to the eyes of infants and children. Indeed, it seems highly probable, that even Mr. Gibson himself would have remained silent upon the subject, had not his attention been roused by the reports of the London Institution for curing diseases of the eye, which reports, he says, were dispersed and exhibited in the public newsrooms of Manchester. For the creation and perfection of this beneficial practice, therefore, I am disposed to give the memory of Mr. Saunders great honour. The propriety of operating for the cataracts of children had long ago been insisted upon by a few writers, and the attempt even now and then made; but, the method never gained any ground, until Mr. Saunders led the way.

It only remains for me to describe the plans of operating, as executed by Mr. Saunders, Mr. Gibson, and Mr. Ware.

The principle, on which Mr. Saunders proceeded in his operations on the congenital cataract, is founded on the opinion, that the only obstacle to the absorption of the opaque lens is the capsule; and that as the latter also is most generally opaque, "the business of art is to effect a permanent aperture in the centre of this membrane. This applies to every case of congenital cataract, which can occur." Mr. Saunders used to overcome the difficulty of operating upon children, by fixing the eye ball with Pellier's elevator, having the patient held by four or five assistants, dilating the pupil with the belladonna, and employing a very slender needle, armed with a cutting edge from its shoulders to its point, and furnished with a very sharp point, calculated to penetrate with the utmost facility.

Before the operation, the extract of belladonna, diluted with water to the consistence of cream, was dropped into the eye, or, to avoid irritation the extract itself was smeared in considerable quantity, over the eyelid and brow. In less than an hour, if there be no adhesions, it produces a full dilatation of the pupil, exposing to view nearly the whole anterior surface of the cataract. The application should then be washed from the appendages of the eye.

In using the needle, Mr. Saunders, most carefully abstained from doing any injury to the vitreous humour, or its capsule, and it was an essential point with him to avoid displacing the lens. In directing the extremity of the instrument to the centre of the capsule, he passed it either through the cornea, near the edge of this membrane, or through the sclerotica, a little way behind the iris. By the first, which is called the *anterior* operation, Mr. Saunders conceived, that less injury would be inflicted, and less irritation excited, than by introducing the needle behind the iris, through all the tunics of the eye. In every case, the first thing aimed at was the permanent destruction of the central portion of the capsule to an extent equal to that of the natural size of the pupil. If the capsule contained an opaque lens, Mr. Saunders used next to sink the needle gently into the body of the crystalline, and moderately open its texture; cautiously observing not to move the lens at all out of its natural situation.

When the case was a fluid cataract, Mr. Saunders was content in the first operation with simply lacerating the centre of the capsule, being desirous of avoiding to increase the irritation following the diffusion of the matter of cataract in the aqueous humour.

When the cataract was entirely capsular, Mr. Saunders acted with rather more freedom, as he entertained in this case less fear of inflammation; but, in other respects, he proceeded with the same objects in view, which have been already related, and of which the principal consisted in effecting a permanent aperture in the centre of the capsule, without detaching this membrane at its circumference; for then the pupil would have been more or less covered by it, and the operation imperfect, "because this thickened capsule is never absorbed, and the pendulous flap is incapable of presenting a sufficient resistance to the needle to admit of being removed by a second operation." (*P.* 145.)

I have already explained, that Mr.

Saunders found, that the greatest success attended the operation between the ages of eighteen months and four years. One operation frequently accomplished a cure; as many as five were seldom requisite.

The only particularity, in Mr. Saunders's treatment of the eye after the operation, was that of applying the belladonna externally, for the purpose of making the pupil remain dilated, till the inflammation had ceased, so as to keep the edge of the iris from contracting adhesions with the margin of the torn capsule. In leaving this part of the subject, I must advise every surgeon to read the interesting account of Mr. Saunders's practice, published by his friend and colleague, Dr. Farre. Many minute particulars will be found in this work, highly worthy of the practitioner's attention and imitation.

Mr. Gibson appears to have been unacquainted with the usefulness of the extract of belladonna in preparing the eye for the operation. A few hours before operating, he was in the habit of ordering an opiate, sufficient to produce a considerable degree of drowsiness, so that the infant generally allowed its eyelids to be opened, and properly secured without resistance, and was little inclined to offer any impediment to the introduction of the couching needle; but, on the contrary, presented the sclerotica to view, naturally turning up the white of its eye. If the infant was more than a year old, and whenever it was necessary, Mr. Gibson used to introduce its body and arms into a kind of sack, open at both ends, and furnished with strings to draw round the neck, and tie sufficiently tight round the legs, so that its hands are effectually secured, and the assistants have only to steady its body, and fix its head, whilst the child is laid on a table, upon a pillow. Mr. Gibson never found it necessary to use a speculum, having uniformly experienced, that, after the couching needle was introduced, he had no difficulty in commanding the eye, aided by a slight degree of pressure upon the eyeball with the index and middle fingers of his left hand, which were employed in depressing the lower eyelid. He admits, however, that the speculum can easily be applied, if an operator prefer it. He generally used Scarpa's needle, because, in infants, the free rupture of the capsule of the lens ought commonly to be aimed at, in order that the milky cataract may escape, and mix with the aqueous humour; or, if the cataract be soft, that the aqueous humour may be freely admitted to its pulpy substance, which has been previously broken down with the needle. He thinks, that no peculiarity is necessary in depressing the hard cataract of infants. Before Scarpa's needle was known in this country, Mr. Gibson used Mr. Hey's, which was generally effectual, and, as he conceives, possesses the recommendation of being less liable to have its point entangled in the iris. He says, that, when a milky cataract has been thus evacuated, it renders the aqueous humour turbid; but, that, within the space of two days, the eye generally acquires its natural transparency, and vision commences. When the capsule and substance of the soft cataract have been broken down, and the aqueous humour has come into contact with the lens, the solution and disappearance of the cataract, in all the cases, upon which Mr. Gibson has operated, have uniformly taken place, in a short time. The experience of Mr. Gibson curiously differs from that of Mr. Saunders in one respect: he assures us, that although he has met with cataracts in infants hard enough to bear depression, yet, that *he has never met with a simple membranous cataract;* though this is no uncommon occurrence in patients at the age of eight, or ten, as well as in adults, who have been blind from birth. (See *Edinburgh Med. and Surgical Journal*, *Vol.* 8, *p.* 398, 399.)

For the purpose of fixing the eye, Mr. Ware thinks Pellier's elevator requisite in operating upon infants. When the patient, however, has advanced beyond the age of infancy, Mr. Ware sometimes fixes the eye by means of the fingers alone. For the purpose of puncturing the capsule, and breaking down the cataract, this gentleman gives the preference to an instrument, which resembles one, that was recommended by Cheselden for the purpose of making an artificial pupil; but, it is somewhat narrower. Its blade indeed is so narrow, that it nearly resembles a needle. Its extremity is pointed, and it cuts on one side for the space of about the eighth of an inch, the other side being blunt. It is perfectly straight; is an inch long in the blade; and forms a complete wedge through its whole length. Upon one side of the handle is a coloured spot, by attending to which, the operator may always ascertain the position of the instrument in the eye.

Mr. Ware dilates the pupil with the extractum belladonna, softened with a little water, and applied about half an hour before the time of operating. This gentleman thinks, that, in operating upon infants, the surgeon will perform the operation with more composure, if the patient be laid upon a table, with the head properly raised on a pillow. The bent end of Pellier's elevator should be introduced under the upper eyelid, and the instrument committed to the care of

an assistant. If the right eye is to undergo the operation, and the surgeon operate with his right hand, he must of course sit or stand behind the patient; and, in this case, he will himself manage the speculum with his left hand. The eye being thus fixed, Mr. Ware passes the point of the narrow bladed knife above mentioned through the sclerotica, on the side next to the temple, about the eighth of an inch from the union of that membrane to the cornea, the blunt edge being turned downwards. The instrument is pushed forwards in the same direction, until its point nearly reaches the centre of the crystalline. The point should then be brought forwards, until it has passed through the opaque crystalline and its capsule, and is plainly visible in the anterior chamber of the aqueous humour. If the cataract be fluid, and the anterior chamber become immediately filled with the opaque matter, Mr. Ware thinks it advisable to withdraw the instrument, and defer further measures until the matter is absorbed, which absorption usually takes place in the course of a few days, and sometimes of a few hours. If no visible change be produced in the pupil, the point and cutting edge of the instrument should be applied in different directions, so as to divide both the opaque crystalline and its capsule into small portions, and, if possible, to bring them forwards into the anterior chamber. This may require the instrument to be kept in the eye for a minute or two; but, if the operator preserve his steadiness, he may continue it there a much longer time without doing the least injury to the iris or to any other part. If the cataract be found of a firm consistence, (though this rarely happens in young persons,) it may be advisable to depress it below the pupil; and in such a case particular care should be taken to perforate largely the posterior part of the capsule, and to withdraw the instrument immediately after the cataract has been depressed, in order to hinder it from rising again. If the opacity be in the capsule, the instrument will not act so easily upon it as it does on the opaque crystalline; but, notwithstanding this, the capsule as well as the crystalline, may be divided by it into larger or smaller portions, which, when thus divided, will be softened by the action of the aqueous humour; and though in the first operation on such case, says Mr. Ware, it may not be possible to remove the opacity, yet, on the second or third attempt, the divided portions may be brought forwards into the anterior chamber of the aqueous humour, in which place, they will then be gradually absorbed, and will soon disappear. After the operation, Mr. Ware has seldom found it necessary to take away blood from children, or persons under the age of twenty. He continues a cooling antiphlogistic treatment a few days. After this, if any opaque matter remain, he expedites its absorption by dropping a small portion of powdered sugar into the eye once or twice a day. When, at the end of a week or ten days, the inflammation is over, and the pupil is obstructed with opaque matter, Mr. Ware advises a repetition of the operation. After a similar interval, the operation may be requisite again. Mr. Ware has, in most cases, been obliged to operate twice; in a few instances, once has been sufficient; and only in three, out of the last twenty, has he found it necessary to operate a fourth time. (*On the Operation of Puncturing the Capsule of the Crystalline Humour.*)

I think any impartial man, who considers the practice of the three preceding operators, will find great cause to admire the superior gentleness and skill, which predominate in the operations of the late Mr. Saunders. For my own part, I am so fully convinced of the mischief, which has been done to the eyes, by the rash boldness, awkwardness, and unsteadiness of numerous operators, that, it appears to me, the inculcation of gentleness and forbearance in all operations for the cataract, is the bounden duty of every man, who has occasion to write upon the subject. Great manual skill, and invariable gentleness, indeed, seem to me to have had more share in rendering Mr. Saunders's operations successful, than any particularity either in his method, or his instrument. I have no hesitation in declaring my own partiality to the principles, on which his practice was founded, and my belief, that they are well calculated to improve most materially this interesting branch of surgery.

SOME OBJECTIONS TO COUCHING CONSIDERED.

As it appears to me, that couching is a fitter operation for general practice, than the extraction of the cataract, and that several unfounded prejudices have been set up against it, I shall conclude this article with a few reflections on this part of the subject.

Conceiving that baron Wenzel, who may be regarded as the chief modern champion of extraction, has had recourse to misrepresentation in the statement of his objections to couching, I shall beg the indulgence of a few minutes, to examine how far his observations coincide with those of other experienced men.

This author writes, (*On the Cataract*, *p.* 34.) that "the pain is severe during the operation:" Scarpa, on the contrary, remarks, that the little pain experienced from it, and the consequent tranquillity

of the patient's mind, may be one reason, why the ophthalmy is always milder after a repetition, than after the first time of couching. (*Saggio di Osservazioni, &c. Sulle Malattie degli Occhi, p.* 255, *Venez*, 1802.) How little foundation there is for this objection, must also appear from the patient's spontaneous acknowledgment. (*Hey's Pract. Obs. in Surgery, p.* 63.) and from the voluntary promptitude, with which he generally submits to a repetition of the operation. Mr. James Lucas remarks, "that a cataract would very frequently be cured by one operation (alluding to depression), but the pain from a repetition of it is so tolerable, that many wish it to expedite their cure." (*Med. Obs. and Inquiries, Vol.* 6, *p.* 256.) Mr. Warner, in making mention of a case, observes, "I was in hopes, from this appearance, that the cataract might in time have subsided, &c. but, on account of the little pain the patient had suffered from these operations, he insisted upon a third;" and it was even repeated a fourth time, at the same person's instigation, before the cure was complete. (*Description of the human Eye, and its Diseases, p.* 88.) From the comparative experiments made by Poyet, Morand, and De la Faye, it would seem, that the pain of extraction and depression is about equal. (*Mém. de l'Acad. de Chirurgie, Tom.* 2, *p.* 572, 4*to.*)

Wenzel next objects, that "the vomiting, which frequently comes on at the distance of some hours after the operation, and the pain produced by the puncture of the retina and ciliary nerves, are apt to produce a collection of matter in the eye." (*On the Cataract, p.* 34, 35.) Mr. Hey has practised couching rather frequently for thirty-three years; he has also seen it frequently performed by his colleagues at the Leeds Infirmary, but has never yet seen an instance of suppuration in the eye after the operation. (*Pract. Obs. in Surgery, p.* 101, 102.) If suppuration should sometimes, in particular constitutions, follow the wound inflicted in couching, and no doubt, it may occasionally ensue from this injury, it can furnish no argument against the operation, since it appears to be an uncommon circumstance, and extraction is not exempt from the same consequence. (*Mém. de l'Acad. de Chirurgie, Tom.* 2, *p.* 581, 582, *&c.* 4*to. Wenzel on the Cataract, p.* 232, *&c.*)

The baron also remarks, that "those, who have been couched, sometimes feel violent pains in the eye as long as they live;" (*p.* 35.) on the contrary, the experienced gentleman last cited, never knew this effect happen after the operation; besides, we cannot but notice, that Wenzel offers no authority for such an assertion but his own naked opinion. I am still not unaware, that Heister speaks of the torment formerly experienced by many after couching. (*Reflections annexed to his 5th Obs.*), and, if Wenzel should chance to make allusion to what this writer has stated, as a foundation for the objection in question, I believe, it cannot be fairly made to answer that purpose. Every novice in the subject before us, must often have read and heard, that a cataract, which presents a good prospect of relief from any kind of operation, ought neither to have been preceded by, nor to be accompanied with pains in the eye and its vicinity: what particulars are detailed in Heister, by which it can satisfactorily be made out, that, in the examples alluded to, such pains did not precede the operation? and, as shooting pains in the eye do sometimes take place before, and independently of any operation, why may they not, in a few rare and solitary cases, happen after it from other distinct causes?

Wenzel also objects, that, "in introducing the couching needle, the blood-vessels of the choroides and retina are liable to be wounded, and the extravasated blood not only confuses the sight of the operator, but, unless speedily absorbed, is apt to produce a suppuration of the whole eye." (*Treatise on the Cataract, p.* 35, 36.) How little reason there is to apprehend the latter part of the objection, must be evident from what has been already delivered; that blood may possibly be effused into the aqueous humour, and obscure the iris and pupil, no one will deny; but, it is a well-known truth, that it is neither a frequent, nor, on account of the mere extravasation, a serious event. Wenzel is entirely mistaken in the source of the hemorrhage under consideration; it is impossible to conceive how blood, effused from the vessels of the choroides and retina, should rather find its way into the aqueous humour than out of the wound externally; at least during the operation, the period when it is alleged to happen; for the only track, through which it could then possibly insinuate itself into this fluid, is absolutely occupied and filled by the couching needle. As Richter more accurately represents, (*Anfangsgründe der Wundarzneykunst.* 3. *Band. p.* 247. *Göttingen*, 1795,) the blood extravasated from the choroides and retina is either voided externally, or, if that be impossible on account of the smallness of the wound, it probably finds its way into the vitreous humour; he confirms, that this sort of hemorrhage is seldom considerable; the blood is usually absorbed without further accident; and, when a round needle is employed, the extravasation rarely occurs at all. The fountain of that hemorrhage, to which Wenzel draws our regard, is totally different from what he would lead

us to suppose; it is not in the vessels of the choroides or retina, but, undoubtedly, in those of the ciliary processes and iris. In this case, the inflammation and suppuration of the eye, were they to occur, would not be so much the effect of the extravasation, as of the unskilful and unnecessary injury of those important parts. Every one is aware, that, in couching milky cataracts, the white contents of the crystalline capsule are often suddenly blended with the aqueous humour, so as entirely to conceal the pupil; yet, so simple of accomplishment in this operation, that several modern surgeons (*Latta, Scarpa, &c.*) do not even postpone its completion on account of this event; they continue to lacerate the capsule, and the opaque fluid, extravasated into the two chambers of the aqueous humour, is very soon absorbed. Neither can the case be considered in a different light, in regard to consequences, when blood is effused into the same situation. By what is here stated, I would by no means have it interpreted, that my opinion coincides with those, who may judge proper to continue the operation in this last circumstance; far from it,—I am too strongly convinced of the propriety of the advice, inculcated by Messrs. Lucas and Hey, that a repetition of so mild an operation is always preferable to attempting too much at one time. "The principal cautions required in couching are, not to wound the iris and ciliary processes, and not to attempt too much at one operation." (*Med. Observations and Inquiries, Vol. 6, p. 256. Also Practical Observations in Surgery, p. 71, 72.*) I have myself seen a rapid effusion of blood take place beneath the cornea, on making the incision of this membrane to extract the cataract; and it evidently proceeded from an injury of the iris.

Another futile objection is, "that the ciliary processes, which surround the crystalline, are liable to be wounded in the different movements of the needle." (*Wenzel on the Cataract, p. 39.*) In the performance of the operation, the needle may, undoubtedly, be used, so as to do considerable mischief; but then it must be from unskilfulness; ignorance of the anatomy of the eye; or from the bad construction of the instrument employed; and, as it is easy to achieve couching in the best style, it cannot justly be chargeable with ills deducible merely from its having been ill executed.

Wenzel asserts, "that an opacity of the posterior layer of the capsule of the crystalline lens takes place much oftener after depression than extraction. (*P. 24.*) Why he should fix upon the posterior part of the capsule I know not. In Mr. Ware's opinion, an opacity of the front portion is much more common. (*See note, p. 25 of Wenzel's Treatise, translated.*) and may now and then happen after the usual manner of couching; but, in the method (which I have explained) in imitation of the celebrated Scarpa, this kind of secondary membranous cataract will hardly ever follow the operation of depression. Callisen, who has enjoyed ample opportunities of estimating in his own experience the advantages and disadvantages, both of extracting and depressing the cataract, states, in his comparative conclusion in favour of the latter, "*A Depressione rarius surgit Cataracta Secundaria, visus perfectior.*" *Vid. System. Chirurgiæ Hodiernæ. Partem. Poster. p. 637. Hafniæ*, 1800. The reason, why the secondary membranous cataract so seldom happens after couching, depends on the circumstance of the capsule being commonly depressed into the vitreous humour at the same time with the opaque lens; a fact to which I shall have occasion to advert again. It is very certain, that, as the advocates of extraction acknowledge their process to be inadequate to remove with safety the species of cataract situated in the posterior layer of the crystalline capsule. (*Wathen on the Cataract, p. 138. Ware, in a note, p. 264 of Wenzel's Treatise, and his Enquiry into the Causes preventing the Success of Extraction, &c. p. 40.*), and which, undeniably, does sometimes take place, it must be a principal object with them to impute the evil, whenever it does happen, to the effect of couching. ("*La Peyronie et Morand firent voir a l'Academie des Sciences des Cataractes vraiment membraneuses qui avoient leur siège dans la capsule Antre. et Postre. du Crystallin.*" *Tom. 3. p. 2. Sabatier.*)

The total closure of the pupil, alleged to happen rarely after extraction, more frequently after depression, suffice it to state, Mr. Hey has never seen, as a consequence of couching, in the course of his long and extensive experience. (*Practical Observations in Surgery, p. 109.*)

Here I shall introduce a short extract from Richter's Elements of Surgery, to shew how much this eminent surgeon has changed in favour of the old operation, in its present improved state.

"With respect to the defects and inconveniences, with which the operation of couching has been upbraided, it has been said; that the same only effects a palliative cure, as the cataract is merely depressed, and is always liable to reascend, and occasion a fresh blindness; that it can only be advantageously put into practice when the cataract is hard; not well when it is soft; and not at all when it is fluid; that it is difficult to ascertain with certainty before the operation the consistence of a cataract; that

the result of this operation is also very uncertain; that, in doing it, all the coats of the eye are constantly pierced; that the body of the vitreous humour is always lacerated by the depressed lens; that the aponeurosis of the abductor muscle, the ligamentum ciliare, and nervi ciliares are frequently injured; and lastly, that the lens, at the time when it is depressed, may easily be forced (without the consciousness or least fault of the operator) against the choroidea and retina, so as to contuse, or even lacerate them.

"These various defects and inconveniences are (says Richter) partly, or entirely without foundation. Experience evinces, that the laceration of the vitreous humour by the cataract is unattended with any bad consequences; it appears from the preceding account, that every sort of cataract, both the soft and fluid, may easily and successfully be operated on with the needle; and that the lens, when it has been properly depressed, seldom or never re-ascends; that it often dissipates, and is quite absorbed in the vitreous humour, by which the patient is completely secured from any secondary blindness; and that, if the lens should happen to rise again, it may always be again easily depressed. Besides, it is much in favour of couching, that the capsule is, probably, in most cases, depressed with the lens, so that the patient continues in no danger of a secondary membranous cataract; that the eyesight afterwards is, as experience declares, commonly more acute than after extraction; that the inflammation is less vehement, than in consequence of the other operation; that, upon the whole, it is much easier than it; and, lastly, that the two parts of the eye, upon the integrity of which sight afterwards principally depends, namely, the cornea and pupil, commonly suffer no injury." (*Anfangsgründe der Wundarzneykunst. Dritter Band.* p. 359, 360.)

Having thus been as brief as possible in attempting to shew the invalidity of some objections urged against couching, I might, perhaps usefully, devote a small portion of these pages to consider particularly the inconveniences of extraction; especially as the great exigency for this disquisition would fully acquit me of any spirit of retaliation. And, although it is, also, very certain, that the smooth side of this method has been solicitously held up to public view, while all its roughnesses and inequalities have been as industriously concealed; yet, since nothing but comparative experiments, instituted upon an extensive and impartial scale, can extricate various questionable points from their present mysterious state, and since men of my own age never command sufficient opportunities for this decisive undertaking, all that I can do is, to reflect a little on what others have made out; to exhort surgeons of large hospitals to put both operations to the test of comparison; and earnestly to invite them to give a faithful detail of the particulars and result to the public. To contrast two rival methods of practice is the only fair and infallible way of ascertaining the best.

On the continent, it appears, Callisen and Scarpa have, like our eminent Pott, built their reflections in favour of couching, not merely upon the firm ground of having themselves successfully and repeatedly practised it, but they have drawn their conclusions, after having with their own hands both extracted and depressed cataracts to that immense extent, which the office of surgeon to a large hospital permits; after having been eye-witnesses of the advantages and disadvantages of each method; and, after exemplifying in the theatres of surgery the comparative practice, upon which their observations and opinions were founded. *Omnibus tamen rite perpensis, tentaminumque ab idoneis chirurgis institutorum eventibus invicem comparatis, facile apparebit, depressionem in universum palmam præripere extractioni, quod quoque propria nostra ac centenorum ægrorum experientia, in quibus operationem cataractæ instituisse nobis contigit, confirmat.* (*Syst. Chirurg. Hodiernæ. Pars. Posterior*, p. 637.) Such is the declaration of Callisen.

The Italian professor, after mentioning the advantages of couching; the facility of accomplishing it; its applicableness to every species of cataract; its producing subsequent symptoms far less severe and dangerous, than those which frequently happen after extraction; and, the power of successfully repeating it, when any incidental circumstance has rendered the primary attempts fruitless; observes, "*Mosso da queste verità di fatto, egli è da molto tempo che, posto a parte il metodo di curare la cateratta per estrazione, io mi sono appigliato onninamente alla practica di quello per depressione, ed ho continui e grandi motivi d' esser contento della presa risoluzione.*" (*Saggio di osservazioni, &c. sulle principali Malattie degli occhi*, p. 231. *Venezia*, 1802.)

A fair comparison is the grand, and, indeed, the only standard of superior merit in any mode of practice; if it will not bear this test, then its exclusive adoption can only be attributed to the arbitrary influence of prejudice, a passion for novelty, or interested motives. Have they, who so deservedly have acquired fame and honour, for the inimitable skill, with which they surmount the difficulties of an arduous operation, have they, in their own experience, contrasted

the two operations of extraction and depression? Have they proved to the world, that there is a case of cataract, remediable by the former, that is not so by the latter process? Have they satisfactorily demonstrated, that their method, backed, as it may be, with considerable adroitness, is more frequently efficacious and successful, than couching properly performed? Have they, in short, proved any thing more, than that they are men of surpassing dexterity, to which are assignable their evasion of the dangers of extraction, and their successful career in practice? Careful, as Baron Wenzel has been, to depict to the public only a series of prosperous cases, yet, the veil is not so dense, but that we may still discern through it many disastrous casualties, to which extraction is exposed: division of the iris; protrusion of the vitreous humour; separation of the iris at its outer margin from the choroid coats; prolapsus of the iris; irregularity of the pupil; irremediable opacity of the lower half of the cornea, &c.

That to couch is an easier thing, than to extract the cataract, all men of great experience in both ways universally agree, and, from the frequent failures in the very attempt to go through the latter operation, no slight argument might be deduced against it; for if it be true, that want of skill ought to throw no discredit upon any operation whatsoever, it must, at least, be granted, that one so difficult as to baffle the ordinary dexterity of surgeons at large, and that is seldom well performed, except by a few professed oculists, has little to recommend it, even supposing it were, what in fact is not, productive of superior efficacy and advantages. "*Depressio haud adeo difficilis est quam extractio, quæ consummatam dexteritatem, vix a multis chirurgis expectandam poscit, si nitide et omnimode ad regulas artis instituetur.*" (*Systema Chirurgiæ Hodiernæ. Pars posterior.* p. 637.) It is not a little remarkable, that Mr. Sharp should, at so early a period of the practice, as when he published his Critical Enquiry, have made the following observation:—"Now, after some trials, it seems rather to have fallen into disrepute, and I apprehend will be entirely discarded in favour of couching. To be candid, (he continues), I perceive that the difficulty of performing the operation is too great to be universally practised." Neither is extraction, in any respect, more applicable to the various kinds of cataract, than depression, which is now found by men of the greatest experience. (*Cusson, Pott, Callisen, Lucas, Scarpa, Hey, Latta, &c. &c.*) by men, whose professional emolument, and reputation, have not depended upon the adoption of this, or any other individual operation; by practitioners of the most unbiassed opinions, and worthy of implicit confidence, to be adequate to the removal of every species of the cataract, whether in the substance, or the capsule of the crystalline lens; whether of a solid, or fluid consistence. But, besides being more easy of accomplishment, freer from accidental inconveniences, and, at least, equally efficacious, it possesses an unrivalled advantage over the opposite method in the practicability of its being successfully applied to infants and children, and repeated, when the first attempts prove inadequate to the perfect restoration of sight, a circumstance almost completely inadmissible after the first failure of extraction. It is true, Baron Wenzel relates two or three cases, where the operation was repeated with advantage, but, who will contend, that such reiterated sections of the cornea would not, in a great number of examples, destroy its transparent texture? But, why need I specify any particular cause of failure? It is enough to mention the result of experience. "*Depressio, si ex voto non successerit absque damno iterum iterumque repeti potest, inutilibus hisce tentaminibus haud impedientibus, quo minus ad Extractionem demum cum successu recurri queat; quod ipsi pluries comperimus; quum e contrario Extractio, si visum non reddat, omnem fere eum recuperandi spem excludat.*" (*System. Chirurg. Hodiernæ. Pars posterior.* p. 637, 638.) To Callisen's I shall add the authority of Scarpa upon this head. "*Perche a motivo di qualche incidente riuscendo alcuna volta infruttuosa la depressione, si puo, senza correre alcun rischio, ripetere due e tre volte la stessa operazione sopra il medesimo occhio: la qual cosa non ha luogo ogni qual volta l' estrazione non ha avuto il desiato successo.*" (*Saggio di Osservazioni, &c.* p. 231.)

Difficult as extraction is upon a favourable eye, it becomes exceedingly more so when it is to be done on the right one; when the cornea is at all defective in point of convexity; when the anterior chamber of the aqueous humour is diminutive; when the muscles of the eye and eyelids are affected with spasms; when the cataract is large, and the pupil small and contracted; and, when the surface of the eye is more than ordinarily sunk in the orbit.

When the cornea is flat, the blade of the knife may easily pass between its layers, and not at all into the anterior chamber; if it should have passed deeply in this manner, an opacity of the cornea is to be apprehended. (*Richter's Anfangsgründe der Wundarzneykunst.* 3 *Band.* p. 277.) A gentleman, professedly in favour of extraction, has affirmed that,

because the couching needle is always entered into the sclerotica, that is, farther back in the eye than the knife in extraction, it must be evident, that the elevated margin of the orbit is a greater impediment to couching, than it can possibly be to extraction. (*Wathen on the Cataract*, *p.* 111.) This statement is, for the following reasons, inaccurate: the knife, in extraction, must absolutely be directed transversely through the anterior chamber; the safety of the iris prescribes this as an invariable rule; but, in couching, the surgeon may, if he chooses, (and Callisen directs this plan in every case) (*Systema Chirurg. Hodiernæ. Pars posterior*, *p.* 616. *Per omnia bulbi involucra in medium humorem vitreum*, *&c.*) introduce the needle in a direction towards the centre of the vitreous humour, by which the inconvenience, that would otherwise arise from the prominent margin of the orbit, may be completely eluded. In extraction, the difficulty would only be augmented by attempting to cut the cornea in any other direction than the common one; for, it is evident, that the projection of the superciliary ridge of the os frontis above; of the nose internally; and the os malæ below; would create an additional source of embarrassment to any such attempt.

Wenzel proposed to pass the knife into the cornea, so that it should take a direction from above, downward and a little inward, and make its exit from the aqueous humour below, rather toward the inner angle of the eye, and cut, not the lower, but the external segment of the cornea; he proposed this with an idea of diminishing the hazard of an escape of the vitreous humour. Richter, in taking notice of the inutility of this plan, on account of the vitreous humour not being protruded merely by its gravity, but some other cause, observes, that it is attended with many difficulties; the prominent os frontis above absolutely hinders the knife from passing through the cornea in such a direction, as possibly to come out again below; should it even be conducted out, its point would certainly injure the lower eyelid, or cheek. In persons, whose eyelids are but little asunder, the knife can hardly be passed from above downward, without cutting both the upper and lower one; and how, continues this author, can the knife be directed from above downward, without being impeded by the fingers of the assistant who holds the upper eyelid? (*Anfangsgründe der Wundarzneykunst*, *p.* 266, 3 *Band.*) In fact, the common manner of cutting the cornea is the most practicable, and no variation in doing it will obviate the great inconvenience, arising from the prominent margin of the orbit in particular subjects.

The great difficulty in cutting the cornea with that accuracy, which the circumstances of extraction require, will ever form a great obstacle to the universal practice of this operation: when the edge of the knife is turned too much forward, the wound is made too small, and, in a situation, where the cicatrix may impede vision; when it is turned perpendicularly downward, or a little inward, the iris will inevitably be cut. In altering the edge of the knife either a little inward or outward, when it has once been introduced inaccurately into the anterior chamber, it is evident, that the form of the instrument can no longer correspond to the wound which it has previously made, and, consequently, the aqueous humour must be very liable to a premature escape. (*Richter's Anfangsgründe der Wundarzneykunst*, 3 *Band. p.* 279, 280.)

In making the incision of the cornea, it sometimes happens, that the pressure of the knife causes the eye to turn towards the inner angle, and, of course, the wound in the cornea cannot, as long as the eye continues in this posture, be properly perfected. I have no hesitation in asserting, that no means of remedying this inconvenience have hitherto been, or are likely to be devised: to endeavour to bring in the aid of an instrument to fix the eye, when once the knife has pierced into the anterior chamber, must be particularly dangerous and unavailing. They, who have had most experience in the practice of this operation, acknowledge, that all contrivances to fix the eye are, by reason of the pressure which they occasion, extremely pernicious and dangerous; and how can the eye be turned outward again without withdrawing the knife? how can the knife be withdrawn without the aqueous humour escaping? how can the instrument be again introduced without injuring the iris? and, if the incision should be enlarged with scissars, what occasion will there be for any contrivance to prevent the eye from rolling toward the inner canthus, an effect that results from the transverse pressure of the knife? Richter confesses, that to make the eye revolve outward, by means of the knife itself, when introduced, requires a circumspect hand; indeed, it must be too hazardous to attempt, because, should the knife be in the least retracted, the aqueous humour would instantly escape, and the iris would fall forward beneath its edge, so as almost inevitably to be cut; and, the moment the knife ceases to fill completely the wound that it has made, it must manifestly lose all power of moving the part, in which it is introduced. In this dilemma the preferable, though objectionable resource, is what Richter advises; to carry the knife per-

pendicularly downward, so as to cut about one-fourth of the circle of the cornea, and afterwards to enlarge the incision by scissars. The knife, when it has entered far into the anterior chamber, cannot be withdrawn without great hazard of injuring the iris, before it is completely out of the eye, and as soon as the aqueous humour begins to escape. But even to carry the knife directly downward, when you are in the dark with respect to the precise position of the cornea, cannot be free from risk; either of the aqueous humour escaping too prematurely over the back of the knife; or of the wound being made too high in the cornea, so that its cicatrix may afterwards obstruct vision, and its size be too diminutive for the easy passage of the cataract; or, lastly, of the wound being carried too much inward toward the iris, so as to injure it. The pressure necessary to extract large cataracts, when the incision in the cornea is not sufficiently extensive, is commonly the source of much mischief: violent inflammation, says Richter, and perpetual blindness are the inevitable consequences of forcible and long-continued pressure on the eyeball. The eye endures nothing so badly as strong pressure of this kind: he observes, when the wound is much too small, and one ventures to extract the lens through it by making considerable pressure, the vitreous humour starts forward, the pupil closes, and the patient remains for ever blind." (*Richter's Anfangsgründe der Wundarzneykunst*, p. 262, 263. 3 *Band*.) When we consider, that these observations come from one, who has had unlimited opportunities of observation; who once wrote so decidedly in favour of extraction; they claim the sincerest confidence.

In regard to the loss of the vitreous humour, unattended, as it undoubtedly has been, in certain instances, with any serious impairment of sight, it is justly considered as a cause very frequently preventing the success of extraction; nor can this objection be got rid of by referring the accident to want of skill in the operator. How human invention shall prevent its escape is difficult of conception, when we consider the nature of those causes, by which it is produced, and the variety of periods, at which it may happen; when we reflect, that it may take place even before the cataract itself is expelled, or immediately afterwards; that it may occur some hours, or some days after the operation; that unforeseen and uncontrollable spasm of the muscles of the eye; coughing, vomiting, sneezing, inadvertent friction, or pressure of the eye during sleep, fright, and other emotions of the mind, &c. may occasion it. If the evidence of experience unequivocally proves, and there is now no reason to doubt it, that a considerable, and even the greatest portion of the vitreous humour, has been protruded without the restoration of sight being prevented, we must refer the common fatality of the occurrence, not simply to the subsequent state of this humour, but to the effect, which its deficiency and sudden exit must have, in changing the condition of other more essential parts of the eye. Did the derangement of the vitreous humour itself, abstractedly considered, create the cause of failure, the effect would then follow as invariably as the accident takes place, which experience contradicts; and couching would, for the same reason, always prove an unsuccessful operation. I shall refer the ill effect, arising from the exit of the vitreous humour, to two other effects, which this event produces, and which operate as the immediate causes of failure. 1st. The unnatural condition, into which the retina must fall when deprived of the support of the vitreous humour. This change must always take place to a considerable degree, when much of this humour is lost. In the singular case, related by Wenzel, (*On the Cataract*, p. 169.) where three-fourths of the whole quantity of the vitreous humour was lost, and yet the success of the operation was not prevented, to what must we ascribe the good fortune? Was it that some accidental circumstances prevented the flow of the aqueous humour (which we know to be secreted very rapidly) through the incision of the cornea, and consequently, that it occupied the place of the vitreous humour very speedily, and thus afforded a timely degree of support to the retina? At all events, no inference can be drawn from so solitary an example, and the success must be attributed to some extraordinary circumstance. 2dly. The considerable injury, perhaps laceration, which the soft and delicate structure of the retina must frequently suffer, when the vitreous humour is suddenly protruded, offers one very rational explanation of the manner, in which the accident so often, and so seriously mutilates the eye.

I shall not dwell here upon wounds of the iris; no skill can regularly prevent their occurrence. No sooner does any instrument penetrate the eye, than the muscles of this organ usually contract in a spasmodic manner, so as to make great pressure upon the part, and to urge forward the cataract and the iris. In this circumstance, we cannot wonder, that the latter should, now and then, be injured by the edge of the instrument. Who can credit that, in the case of the iris being entangled against the edge of the knife, it can be so invariably disengaged without injury, as Wenzel describes, 'by gently touching the cornea with the finger?

Richter justly observes, that this manœuvre is, also, not without risk of pressing out the aqueous humour; especially, if the irritation of touching the eye with the finger, should cause it to move; or, if the operator should, in the least, disturb the knife. (*Anfangsgründe der Wundarzneykunst*, 3 *Band. p.* 334, 335.)

It is unnecessary to enter into an argument against the slight importance, which Richter attaches to the escape of the vitreous humour, and wounds of the iris. They must ever be considered as the two chief dangers, to which extraction is exposed.

Much as they, who espouse the side of extraction, have dwelt on the eradicative nature of that operation, it is an undeniable fact, that large fragments of soft cataracts frequently remain unobserved, at the time of operating, about the circumference of the capsule; a few days afterwards glide into the centre of the pupil, and continue to impede vision, until the same process takes place to remove them, which takes place in consequence of couching, and renders this latter operation, in reality, quite as productive of a radical cure as the former. It is also a well-known thing, that in extracting a cataract, the principal and almost sole aim of the operator, consists in endeavouring to extract an opaque lens from its capsule; no attempt is, or can safely be made to avert the occurrence of the secondary membranous cataract. This is the practice of Wenzel, Ware, and I believe of almost all the eminent patrons of extraction. Richter was well convinced, how uncertain this leaving of the capsule always rendered the result of the operation; he, therefore, directs its anterior layer to be broken, and pierced very freely with the instrument employed to make an opening into it; he also saw the advantage, that would proceed from extracting the capsule together with the lens; but, he likewise perceived the impediments to the accomplishment of so desirable an object. (*Anfangsgründe der Wundarzneykunst, p.* 330, *&c.* 3 *Band.*)

I am bold enough to presume, that the most fertile genius will never be able to suggest any means, that will serve to obviate the accumulated danger, when the cataract is large, the iris very irritable and contracted, consequently the pupil small: and how much real cause there is to fear, in this case, a sudden, but imperfect exit of the cataract, with protrusion of the vitreous humour, and such distension of the iris, as to create future irregularity of the pupil, it is superfluous to dwell upon. It is a more important reflection, inasmuch as soft cataracts, of various descriptions, are as frequently met with as firm ones, generally of large size, and the caseous kind, to which I particularly allude, not unfrequently even of twice the ordinary dimensions of a healthy lens. "Es ist nichts ungewohnliches, dass der weiche Staar noch einmal so gross ist, als die gesunde Krystallinse." (*Richter's Anfangsgr. der Wundarzn. p.* 178, 3 *Band.*)

I shall conclude this part of my observations with a passage from Richter's Elements of Surgery. "The principal advantages of extraction consist in its injuring none of the more sensible parts of the eye, only the insensible cornea, and in its radically curing the cataract, that is, taking it entirely out of the eye. But it may, with reason, be objected; that the cure of the cataract by extraction, ought, on no account, to be called radical, while the capsule, the seat of the possible, and not unfrequent secondary membranous cataract, remains behind in the eye; that far more important accidents are to be dreaded after extraction, than couching; opacity of the cornea; closure of the pupil; prolapsus of the vitreous humour and iris; and that extraction is much more difficult, and more subject to consequent inflammation, than depression." (*Anfangsgr. der Wundarzn. p.* 360, 361. 3 *Band.*)

This author, except at one place, (*P.* 316, 317.) where he would induce one to believe, that the loss of part of the vitreous humour is rather advantageous, inasmuch as it renders the sight more acute afterwards, and the disposition to ophthalmy less, than when no such accident has happened, constantly enumerates it in the train of dangers, and takes great pains to inculcate how it is to be avoided. The inference to be drawn from this ambiguity is too conspicuous to require mentioning. (*Critical Reflections on the Cataract*, 1805.)

On the subject of the cataract, consult particularly *Celsus De Re Medicâ. Pott's Remarks on the Cataract, Vol.* 3, *of his Chirurgical Works. Daviel sur une Nouvelle Méthode de Guérir la Cataracte par l'Extraction du Crystallin, in Mém. de l'Acad. de Chirurgie, Tom.* 5, *p.* 369, *Edit.* 12*mo. Wenzel's Treatise on the Cataract, by Ware. Richter's Treatise on the same subject, and his Anfangsgrunde der Wundarzneykunst, Band* 3. *Ware's Chirurgical Observations on the Eye,* 2 *Vol. Edit.* 3. *Scarpa's Observations on the Principal Diseases of the Eyes. Hey's Practical Observations in Surgery. Saunders on Diseases of the Eye, by Farre. Beer's Practische Beobachtungen über den grauen Staar, &c. Vienna,* 1791. *Lassus, Pathologie Chirurgicale, Tom.* 2, *p.* 504, &c. *Edit.* 1809. *Léveillé, Nouvelle Doctrine Chirurgicale, Tom.* 3, *p.* 308, &c. *Richerand's Nosographie Chirurgicale, Tom.* 2, *p.* 84, *Edit.* 2.

CATHETER. (from καθιημι, to thrust into.) A tube which is introduced through the urethra into the bladder, for the purpose of drawing off the urine. (See *Urine, Retention of.*) Of course there are two kinds of catheters, one intended for the male, the other for the female urethra. The common catheter is a silver tube, of such a diameter as will allow it to be introduced with ease into the urethra, and of various figures and lengths, according as it is intended for the young or adult, the male or female, subject. A common male catheter is ten or eleven inches long. In general, a large instrument of this kind, like a large bougie, will enter the bladder with more ease than a small one, because less likely to be entangled in the lacunæ of the urethra. One-third of the male catheter, towards its point, should be moderately curved; the other two-thirds, towards its handle, should be straight. The instrument, when gently curved, is found to be more easy of introduction than when it is very much bent. The female catheter is straight, excepting a slight curvature towards its point, and it is about six inches long.

The catheter, as it need not enter far into the neck of the bladder, though it should always be as big as the urethra will easily admit, should not, says John Bell, be long, and should have a very gentle and simple curve. (*Principles of Surgery, Vol.* 2, *p.* 193.)

The common flexible catheter is only a hollow bougie, and the elastic one contains in its composition elastic gum. The two last descriptions of catheters have the advantage of being less irritating to the urethra, and less apt to become covered with calculous incrustations, than silver tubes. They can also be frequently introduced when an inflexible metallic one will not pass.

Flexible catheters are now generally made of woven silk cylinders, covered with a coat of elastic gum. The best have hitherto been fabricated by M. Bernard, of Paris; but they are at present well manufactured by Mr. Walsh, of London. Their size and form vary, according to the age or sex of the patient. Bernstein, in his Dictionary of Surgery, gives the following account of this instrument, as it is fabricated in Germany: "One of the most useful inventions which have been made, with respect to these instruments, is to construct them of elastic gum, and the merit of this invention is to be ascribed, without doubt, to Theden. *Neue Bemerkungen u. Erfahrungen*, &c. *Th.* 2. *Berlin*, 1782, *p.* 143. They were afterwards improved by a silversmith at Paris, of the name of Bernard, who directed not to apply the dissolved elastic gum to a wire cylinder, as Theden had done, but to one made of knitted silk; and these catheters certainly deserve to be recommended in preference to all others. But with respect to their price, the elastic catheters, that are prepared by Pickel, of Wirzburg, (*Richter's Chir. Bibliothek*, *B.* 6, *p.* 512), deserve particular recommendation. These consist of silk cylinders, plaited, or worked upon a probe, and afterwards covered with the following varnish: three parts of white-lead, minium, or sugar of lead, with boiled linseed oil, which is the common varnish used by cabinet-makers, mixed with one part of melted amber, and the same quantity of oil of turpentine. With this varnish he spreads the silk cylinders, and repeats this three times, as soon as the former coating has dried in the open air; after which he puts the catheters into a baker's oven 24 hours, when bread has been baked in it the last time, and when it retains the temp. of 60. 70. Reaum. Here he lets them remain 10 or 12 hours. When he has taken the catheter out of the oven, he rubs the inequalities off with a little pumice-stone, sews up the end, cuts into it the oblong lateral aperture, and then spreads it 12 or 15 times more with the varnish. Every time, however, the catheter must be well dried in the open air, before the varnish is spread upon it again, and after every third coating which it has received, it must be put into the oven again, so that it must in all have received from 15 to 18 coatings with varnish, and have been laid five or six times in the oven. The end is smoothed off with oil. Each of these catheters costs a dollar." (*Cyclopædia by Rees, Art. Catheter.*)

Sometimes it is difficult to introduce the inflexible catheter, in consequence of the urethra and neck of the bladder being affected with spasm. In this case a dose of opium should be administered, before a second attempt is made. When inflammation prevails in the passage, the introduction may often be facilitated by a previous bleeding.

The operation of introducing the catheter may be performed, either when the patient is standing up, sitting, or lying down.

In doing it, one of the most important maxims is, never to force forward the instrument, when it is stopped by any obstacle. If there are no strictures, the stoppage of the catheter is always owing to one of the following circumstances. Its beak may be pushed against the os pubis. This chiefly occurs when the handle of the instrument is prematurely depressed. Here the employment of force can obviously do no good, and may be productive of serious mischief. The beak of the catheter may take a wrong direction, and push against the side of the ure-

thra, especially at its membranous part, which it may dilate into a kind of pouch. In this circumstance, if force were exerted, it would certainly lacerate the urethra, and occasion a false passage. The end of the catheter may get entangled in a fold of the lining of the urethra, and here force would be equally wrong. Lastly, the point of the instrument may be stopped by the prostate gland, in which case force can be of no service, and may do great harm. Hence it is always proper to withdraw the instrument a little, and then push it gently onward in a different position.

The operation may be divided into three stages. In the first, the catheter passes, in the male subject, that portion of the urethra which is surrounded by the corpus spongiosum; in the second, it passes the membranous part of the canal, situated between the bulb and the prostate gland; and in the third, it enters this gland, and the neck of the bladder.

In the first stage, little trouble is usually experienced; for the canal is here so supported by the surrounding corpus spongiosum, that it cannot easily be pushed into the form of a pouch, in which the end of the instrument can be entangled. The operator need only observe the following circumstance: the penis should be held, by placing the corona glandis between the thumb and the index finger of the left hand: in this way the entrance of the urethra will not be at all compressed. The penis is then to be drawn upward: the catheter being well oiled, is now to be introduced, with the concavity towards the abdomen, into the urethra, directly downward, until its point reaches the bulb. As soon as this is accomplished, and the beak of the instrument has passed under the arch of the pubes, the surgeon must very slowly bring the handle of the catheter forwards, between the patient's thighs, and, as he is doing this, the beak of the instrument becomes elevated, and glides into the bladder. In this stage of the operation the penis must be allowed to sink down, and not be kept tense, as this would only drag the membranous part of the urethra against the os pubis, and render the passage of the instrument more difficult.

The operation, however, is not always successfully accomplished in this manner. The beak of the catheter may be stopped by the os pubis; it may take a wrong direction, so as to push the membranous part of the urethra to one side or the other; or it may be stopped by a fold of the lining of the passage.

The first kind of impediment is best avoided, by not depressing the handle of the catheter too soon; that is, before the point has passed beyond the arch of the pubes. When the membranous part of the urethra is pushed to one side or the other, the instrument ought to be withdrawn a little, and then pushed gently on in a different direction. When this expedient is unavailing, the index finger of the left hand may be introduced into the rectum, for the purpose of supporting the membranous part of the urethra, and finding the extremity of the catheter.

When the prostate gland is enlarged, the diameter of the urethra does not undergo any diminution as it passes through the diseased body; but it turns up very suddenly, just as it approaches the bladder. In such cases, the end of the catheter should be more bent upward, than the rest of its curvature.

In the third stage of the operation, the beak of the instrument has to pass the prostate gland and neck of the bladder. The principal obstacles to its passage, in this situation, arise from spasm of the neck of the bladder, and from the instrument being pushed against the prostate gland. The first impediment may generally be obviated by waiting a few moments, and gently rubbing the perineum, before pushing onward the catheter. The hindrance, caused by the prostate, is best eluded by using an instrument the point of which is more curved than its other part. Sometimes the surgeon himself presses the prostate towards the os pubis, by means of his finger in the rectum, and thus prevents the passage of the catheter, by increasing the sudden curvature at this part of the urethra. Hence, as Richter observes, it is a very important maxim, never to introduce the finger so far into the rectum, as to press on the prostate gland itself.

When the catheter has turned round the pubes, and is just about to enter the neck of the bladder, is the critical moment, in which may be seen, whether a surgeon can or cannot pass a catheter; for, if he knows how to pass it, he suddenly, but not violently, changes its direction. He depresses the handle with a particular kind of address, and raises the point, which, as if it had suddenly surmounted some obstacle, starts into the neck of the bladder, and the urine bursts out in a jet from the mouth of the catheter.

They, who are unskilful, press the tube forward, and persist, as they had begun, in drawing up the penis, on the supposition that by stretching this part they lengthen the urethra, and make it straight, whereas they elongate only that part of the canal, along which the catheter has already passed. (*John Bell's Principles of Surgery, Vol. 2, p. 213.*)

Mr. Ware passes the catheter in the following manner: the instrument being first thoroughly oiled, he introduces it

into the urethra, with its convex part uppermost, and carries it as far as it will pass without using force. He then turns it *slowly* round, so as to bring its concave side uppermost; and in doing this he makes a large sweep with the handle of the instrument, and at the same time keeps his attention steadily fixed on its apex, which he takes particular care not to retract, nor to move from its first line of direction. When the catheter is turned, it must still be pressed onward, and its handle at the same time gently depressed. By this method, says Mr. Ware, it will be made to enter the bladder.

The catheter, made use of by Mr. Ware, is twelve inches long, which is more than an inch above the ordinary length; and the curvature is larger than common. With this instrument he has often succeeded, when with others of a different size and curvature it was not possible to succeed.

A great number of excellent modern surgeons prefer introducing the catheter as far as the perineum, as Mr. Ware does, with its convexity towards the abdomen. They then keep the point stationary while they make the handle describe a semicircular movement upward, so as to bring the concavity of the instrument towards the pubes. The catheter then becomes situated just as it is in the other method.

Hr. Hey has offered some good practical remarks on the introduction of the catheter. If, says he, the point of the catheter be less turned than the urethra, the point will be pushed against the posterior part of the passage, instead of following the course of the canal. The posterior part of the urethra has nothing contiguous to it which can support it; and no considerable degree of force will push the point of the catheter through that part between the bladder and the rectum. If this accident is avoided, still the point will be pushed against the prostate, and cannot enter the bladder. Mr. Hey tells us, that the truth of this is illustrated, by the assistance which is derived, whenever the catheter stops at the prostate, from elevating the point of the instrument with a finger introduced in the rectum.

Mr. Hey takes notice of the impropriety of pushing forwards the point of the catheter, before its handle is sufficiently depressed, as the point would move in a horizontal direction, and be likely to rupture the posterior side of the urethra.

The difficulty, arising from the inflamed and dry state of the passage, Mr. Hey says, is greatly obviated by the previous introduction of a bougie well covered with lard.

In order to pass the catheter, Mr. Hey places his patient on a bed, in a recumbent posture, his breech advancing to, or projecting a little beyond, the edge of the bed. If the patient's feet cannot rest upon the floor, Mr. Hey supports the right leg by a stool, or by the hand of an assistant. The patient's head and shoulders are elevated by pillows; but the lower part of the abdomen is left in a horizontal position. Mr. Hey commonly introduces the catheter with its convexity towards the abdomen, and having gently pushed down the point of the instrument, till it becomes stopped by the curvature of the urethra, under the symphysis pubis, he turns the handle towards the navel, pressing at the same time its point. In making the turn he sometimes keeps the handle at the same distance from the patient's abdomen, and sometimes makes it gradually recede; but, in either method, he avoids pushing forwards the point of the catheter any farther than is necessary to carry it just beyond the angle of the symphysis pubes. When he feels that the point is beyond that part, he pulls the catheter gently towards him, hooking, as it were, the point of the instrument upon the pubes. He then depresses the handle, making it describe a portion of a circle, the centre of which is the angle of the pubis. When the handle of the catheter is brought into a horizontal position, with the concave side of the instrument upwards, he pushes forwards the point, keeping it close to the interior surface of the symphysis pubis; for when passing in this direction, it will not hitch upon the prostate gland, nor injure the membranous part of the urethra.

If the surgeon uses a flexible catheter, covered with elastic gum, it is of great consequence to have the stilet made of some firm metallic substance, and of a proper thickness. Mr. Hey always makes use of brass-wire for the purpose. If the stilet is too slender, the catheter will not preserve the same curvature during the operation; and it will be difficult to make the point pass upwards behind the symphysis pubis in a proper direction. If the stilet is too thick, it is withdrawn with difficulty.

When the stilet is of a proper thickness, this instrument has one advantage over the silver catheter, which is, that its curvature may be increased while it is in the urethra, which is often of great use, when the point approaches the prostate gland.

When the proper manœuvres with an inflexible catheter do not succeed, the surgeon must change it, taking a bigger or more slender one, with a greater or less curve, according to such observations as he may have made in his first attempt. But if the catheter has been of a good form or commodious size, yet has not passed easily, he should, instead of choosing a

rigid catheter of another size or form, take a flexible one for his second attempt. The flexible catheter is generally slender, and of sufficient length, and its shape may be accommodated to all occasions, and to all forms of the urethra; for, having a stiff wire, we can give that wire, either before or after it has passed into the catheter, whatever shape we please; and what is of still greater importance, we can introduce the instrument without, or with the wire, as circumstances may require; or what is more advantageous, we can introduce the wire particularly so as not quite to reach the point of the catheter, but to within two inches or a little more of this part, by which contrivance the point, if previously warmed, and wrought in the hand, has so much elasticity, that it follows the precise curve of the urethra, and yet has sufficient rigidity to surmount any slight resistance. If this too fail, and especially, if there be the slightest reason to suspect, that the resistance is not merely spasmodic, but arises from stricture near the neck of the bladder in a young man, or swelling of the prostate in an old one, we may take a small bougie, turn up the extremity of it with the finger and thumb, so as to make it incline towards the pubes, and allowing no time for the wax to be softened, pass it quickly down to the obstruction, turn it with a vertical or twisting motion, and make it enter the constricted part. On withdrawing it in about ten minutes or a quarter of an hour, the urine generally escapes, or the catheter may now be introduced. (*John Bell's Principles of Surgery, Vol. 2, p. 215.*)

Mr. Hey has found, that in withdrawing the stilet of an elastic gum catheter, the instrument becomes more curved; and he has availed himself of this information, by withdrawing the stilet, as he is introducing the catheter beyond the arch of the pubes, by which artifice the point is raised into the due direction.

Mr. Hey says, you may sometimes, though not always, succeed in introducing an elastic gum catheter, by using one which has acquired a considerable degree of curvature and firmness, by having had a curved stilet kept in it a long while. Introduce this without the stilet, with its concavity towards the abdomen, taking care not to push on the point of the instrument, after it has reached the symphysis pubis, until its handle is depressed into a horizontal position.

When it is necessary to draw off the urine frequently, and the surgeon cannot attend often enough for this purpose, a catheter must be left in the urethra, till an attendant, or the patient himself, has learnt the mode of introducing the instrument. (*Hey.*)

Mr. Hey imputes the formation of a false passage, or the rupture of the membranous part of the urethra, generally to the method of pushing forwards the catheter, before its handle has been depressed. In this manner the course of the instrument crosses that of the urethra, and the point of the catheter, pressing against the posterior side of the membranous part of the urethra, is easily forced through the coats of that canal. The want of due curvature in the catheter, and of sufficient bluntness in its point, greatly contribute to facilitate this injury. In this case the point of the instrument passes more readily into the wound, than onward along the urethra against the symphysis pubis. Without this pressure, the point is apt to recede, and not readily enter the membranous part of the urethra.

Mr. Hey surmounted a difficulty of this kind, by bending upwards the point of a silver catheter, so as to keep it more closely in contact with the anterior part of the urethra, and thereby pass over the wound made in the posterior side of the canal. In the instance alluded to, as it was necessary to leave an elastic gum catheter in the urethra, Mr. Hey procured some brass wire of a proper thickness, with which he made a stilet, and, having given it the same curvature as that of the silver catheter, he introduced it about four hours after the preceding operation, and fixed it by tying it to a bag truss.

Mr. Hey sometimes succeeded by partly withdrawing the stilet, at the moment when he wished to increase the curvature of the catheter.

In an instance in which the urethra had suffered a violent contusion, Mr. Hey drew off the urine with a silver catheter of unusual thickness, after he had failed with instruments of a smaller bore. He suspected that the urethra was ruptured, and was obliged to raise the point of the catheter by a finger introduced into the rectum, and to use bleeding, purgatives, the warm bath and opium, before it could be made to pass. The elastic gum catheter was afterwards employed. It is an unsettled point, whether it is best to leave the catheter in the urethra, until the power of expelling the urine is regained, or to draw off the urine twice a day, and withdraw the catheter after each operation. Mr. Hey thinks that no general rule can be laid down; some patients cannot bear the catheter to remain introduced; others seem to suffer no inconvenience from it. On the whole, however, Mr. Hey commonly prefers removing the catheter. In this manner, he is of opinion, that the power of expelling the urine again is soonest acquired.

To one acquainted with anatomy, the

introduction of the female catheter is exceedingly simple. From motives of delicacy to the sex, the instrument should always be passed without any exposure. The surgeon should hold the catheter in his right hand, while he introduces the forefinger of his left hand between the nymphæ so as to feel upon the upper surface of the passage the little papilla, which surrounds, and denotes to the touch, the precise situation of the orifice of the meatus urinarius. Holding the concavity of the catheter forward, the surgeon, guided by the forefinger of his left hand, is then to introduce the instrument upward into the bladder. (See *Urine, Retention of.*) (See *Hey's Practical Observations in Surgery. John Bell's Principles, Vol.* 2. *Ware on the Catheter. Richter's Anfangsgr. der Wundarzneykunst. Rees's Cyclopædia, Art. Catheter.*)

CATHETERISMUS. (from καθιστημι, the instrument.) A technical word, employed by P. Ægineta, to denote the operation of introducing the catheter.

CATLING, often spelt, in surgical books, *catlin*, is a long, narrow, double-edged, sharp-pointed, straight knife, which is chiefly used, in amputations of the leg and forearm, for dividing the interosseous ligaments and the muscles, &c. situated between the two bones. The catling is frequently made too wide and large, so that it cannot execute its office with the right degree of ease.

CATOMISMOS. Paulus Ægineta signifies by this word the method of reducing a dislocated humerus, by placing the patient's arm over a strong man's shoulder, and making the latter raise him in this position off the ground, by which means, the limb becomes reduced by the weight of the body.

CATULOTICA. (from κατηλοω, to cicatrize.) Medicines for healing wounds.

CAUSTICS. (from καιω, to burn.) *Caustica.* Medicines, which destroy parts by burning, or chemically decomposing them.

The potassa fusa (kali purum), the potassa cum calce (calx cum kali puro), the antimonium muriatum, the argenti nitras, the hydrargyri nitrico-oxydum, the acidum sulphuricum, and the cupri sulphas, are the caustics in most frequent use among surgeons.

CAUTERIZATION. (from καυτηριαζω, to cauterize.) *Cauterisatio.* The burning any part with a cautery.

CAUTERY. (from καιω, to burn.) *Cauterium.* Cauteries are of two kinds, viz. *actual* and *potential.* By the first term is implied a heated iron; by the second, surgeons understand any caustic application.

CELE. (from κηλεω, to swell out.) A tumour.

CELOTOMIA. (from κηλη, a tumour or hernia, and τεμνω, to cut.) This has two meanings, viz. the operation for a hernia, and castration.

CERATMALGAMA. (from κηρος, wax, and αμαλγαμα, a mixture.) A cerate.

CERATOTOME. (from κερας, a horn, and τεμνω, to cut.) This is the name which Wenzel has given to the knife, which he was in the habit of using to divide the cornea, or horny coat of the eye.

CERATE. (from κηρος, wax, the usual basis of its composition.) *Ceratum.* A composition rather harder than ointment, and softer than plaster.

In this work we need only mention a few particular ones.

CERATUM CALAMINÆ. (L.) A good simple dressing.

CERATUM CALOMELANOS. ℞. *Calom.* ʒi. *Cerati Lapid. Calamin.* ʒss. M. Some practitioners are partial to this as a dressing for chancres.

CERATUM CETACEI. (L.) The spermaceti cerate. A mild unirritating salve for common purposes.

CERATUM CICUTÆ. ℞. *Unguenti Cicutæ* lbj. (See *Unguentum.*) *Spermatis Ceti* ʒij. *Ceræ Albæ,* ʒiij. M. One of the formulæ at St. Bartholomew's Hospital, occasionally applied to cancerous, scrofulous, phagedenic, herpetic, and other inveterate sores.

CERATUM LYTTÆ. (L.) This, which was lately called the cerate of cantharides, was once much used for stimulating blistered surfaces, in order to maintain a discharge. The ceratum sabinæ, however, has almost rendered this application useless, as it answers much better, and is not attended with the danger of bringing on strangury, inflammation of the bladder, &c.

CERATUM PLUMBI SUPERACETATIS. (L. Acetite of lead.) A very eligible, mildly astringent, unirritating salve.

CERATUM PLUMBI COMPOSITUM. (L.) Lately the ceratum lithargyri acetati. This is an excellent, unirritating, cooling salve for common purposes.

CERATUM SABINÆ. ℞. *Sabinæ Recentis Contusæ Ceræ Flavæ,* sing. lbj. *Adipis Suillæ,* lbiv. Mix the savin with the melted wax and hog's lard, and strain the composition.

This is the famous application for keeping open blisters, on the plan recommended by Mr. Crowther. We have noticed in the article *Blisters,* what he says on the subject in the last edition of his work.

CERATUM SAPONIS. (L.) ℞. *Lithargyri lævigati lib.* j. *Aceti cong.* j. *Saponis unc.* viij. *Olei olivæ. Ceræ flavæ* sing. *lib.* j.

This is the *soap cerate* of St. Bartholomew's Hospital, and adopted by the College. In preparing it, the utmost caution must be used. The three first ingredients are to be mixed together and boiled gently till all the moisture is evaporated; after which, the wax and oil, previously melted together, must be added. The whole composition, from first to last, must be incessantly and effectually stirred, without which the whole will be spoiled. This formula was introduced into practice by Mr. Pott, and is found to be a very convenient application for fractures, and also as an external dressing for ulcers; being of a very convenient degree of adhesiveness, and at the same time possessing the usual properties of a saturnine remedy.

In applying this cerate, spread on linen, in fractures of the leg or arm, one caution is necessary to be observed, namely, that it be in two distinct pieces; for if, in one piece, the limb be encircled by it, and the ends overlap each other, it will form a very inconvenient and partial constriction of the fractured part, in consequence of the subsequent tumefaction. (*Pharm. Chirurg.*)

CERCOSIS. (from κιρκος, a tail.) An enlargement of the clitoris, which hangs from the vagina like a tail.

CEREBRUM. The brain; for concussion of; compression of, &c. see *Head, Injuries of.* For inflammation of, see *Phrenitis.* For hernia of, see *Hernia Cerebri.*

CERION. (from κιρος, wax.) A honeycomb. A small sore, with an orifice like the cell of a honey-comb.

CERU'MEN AURIS. A degree of deafness is frequently produced by the lodgment of dry pieces of this substance in the meatus auditorius. The best plan, in such cases, is to syringe the ear with warm water, which should be injected with moderate force.

In some instances, deafness seems to depend on a defective secretion of the cerumen, and a consequent dryness of the meatus. Here, it is advisable to introduce a drop or two of sweet oil every now and then into the ear, and to apply fomentations.

CERUSSA ACETATA. Sugar of lead. Acetite of lead. This preparation, which is now named by the college *plumbi superacetas*, is well known as an ingredient in a variety of lotions and collyria. It has the qualities of saturnine applications in general, being highly useful for diminishing inflammation.

CHALAZIUM. (from χαλαζα, a hailstone.) This signifies a little tubercle on the eyelid, which has been whimsically supposed to resemble a hail stone. It is the same as the hordeolum or stye. (See *Hordeolum.*)

CHAMOMILE. The flowers, which are bitter and aromatic, are used in surgery, for making fomentations.

CHANCRE. (from καρκινος, *cancer venereus.*) A sore which arises from the direct application of the venereal poison to any part of the body. Of course it almost always occurs on the genitals. Such venereal sores, as break out from a general contamination of the system, in consequence of absorption, never have the term *chancre* applied to them. (For an account of the nature and treatment of chancres, see *Venereal Disease.*)

CHARPIE. (French.) Scraped linen, or lint.

CHEILOCA'CE. (from χειλος, the lip, and κακον, an evil.) A swelling, or ulceration of the lip. The same disease as the *Cancrum Oris*, which see.

CHEMOSIS. (from χαινω, to gape.) When ophthalmy or inflammation of the eye, is very violent, it frequently happens, that one or more vessels become ruptured on the side next the eyeball, and a quantity of blood is effused into the cellular membrane, which connects the conjunctiva with the anterior hemisphere of the eye. Hence, the conjunctiva becomes gradually elevated upon the eyeball, and projects towards the eyelids, so as to conceal within it the cornea, which appears, as if it were depressed. (*Scarpa.*) In this way the middle of the eye assumes the appearance of a gap, or aperture.

When blood is extravasated under the tunica conjunctiva, there cannot be an easier or more effectual remedy than æther. A few drops are to be poured into the palm of the hand, and diffused over it, which may be immediately done by pressing the other hand against it. The hand is then to be applied to the eye, and kept so close to it, that the spirit, as it evaporates, may insinuate itself into the part affected, and act on the blood, so as to disperse it. (*Ware on Ophthalmy.*)

In a few instances of chemosis, in which the swelling and inflammation of the conjunctiva have been great, the following application has been found particularly beneficial, after free evacuations: ℞. *Interiorum foliorum recentium Lactucæ Sissilis,* ℥iij. *Coque cum Aq. Pur.* ℥ss. *In balneo mariæ pro semihora; tunc exprimatur succus, et applicetur paululum ad oculos et ad palpebras, sæpe in die.* (*Ware.*)

Ophthalmy, attended with chemosis, demands the most rigorous employment of the antiphlogistic treatment. Both general and topical bleeding should be speedily and copiously put in practice, with due regard, however, to the age and strength of the patient. Leeches should be applied to the vicinity of the eyelids, or, what is preferable, the temporal artery should be opened. When the chemosis is very con-

siderable, the distention of the conjunctiva may be relieved by making an incision into this membrane, near its junction with the cornea. (See *Ophthalmy.*)

CHEVASTER or CHEVA'STRE. A double headed roller, the middle of which was applied to the chin. The bandage then crossed at the top of the head, and passed on each side to the nape of the neck, where it crossed again. Then it was carried up to the top of the head, and so on, till all the roller was exhausted.

CHIA'STOS. A bandage described by Oribasius, and so called from being similar in shape to the Greek letter χ.

CHIA'STRE. A bandage for stopping hemorrhage from the temporal artery. The roller employed is double headed, about an inch and a half wide, and four ells long. The middle of the roller is applied to the unwounded side of the head; the bandage is carried round to the bleeding temple, and there made to cross over a compress on the wound. The roller is then continued over the coronal suture, and under the chin, care being taken to make the bandage cross upon the compress. In this way the roller is applied round the head, till the whole is spent.

CHILBLAINS are the effect of inflammation, arising from cold. A chilblain, in its mildest form, is attended with a moderate redness of the skin, and a sensation of heat and itching, all which symptoms, after a time, spontaneously disappear. In a more violent degree, the swelling is larger, redder, and sometimes of a dark blue colour; and the heat, itching, and pain, are so excessive, that the patient cannot use the part. In the third degree small vesicles arise upon the tumour, which burst and leave excoriations. These are soon converted into ill-conditioned sores, which sometimes penetrate even as deeply as the bone, discharge a thin ichorous matter, and generally prove very obstinate. The worst stage of chilblains is attended with sloughing.

Chilblains are particularly apt to occur in persons, who are in the habit of going immediately to the fire, when they come home in winter with their fingers and toes very cold; they are also particularly frequent in persons, who often go suddenly into the cold, while very warm. Hence, the disease most commonly affects parts of the body, which are peculiarly exposed to these sudden transitions; for instance, the nose, ears, lips, hands, and feet. Richter remarks that they are still more frequently occasioned, when the part, suddenly exposed to cold, is in a moist perspiring state, as well as a warm one. Young subjects are much more liable to this troublesome complaint than adults; and females brought up in a very delicate manner, are generally more afflicted, than the other sex.

The most likely plan of preventing chilblains is to accustom the skin to moderate friction; to avoid hot rooms and making the parts too warm; adapt the quantity and kind of clothing to the state of the constitution, so as to avoid extremes, both in summer and winter; to wash the parts frequently with cold water; to take regular exercise in the open air in all weathers; and to take particular care not to go suddenly into a warm room, or very near the fire, out of the cold air.

Although chilblains of the milder kinds are only local inflammations, yet they have some peculiarity in them, for they are not most benefited by the same antiphlogistic applications, which are most effectual in the relief of inflammation in general.

One of the best modes of curing chilblains of the milder kind is to rub them with snow, or ice-cold water, or to bathe them in the latter, several times a day, keeping them immersed each time, till the pain and itching abate. After the parts have been rubbed or bathed in this way, they should be well dried with a towel, and covered with flannel or leather socks.

This plan is perhaps as good a one as any; but it is not that which is always congenial to the feelings and caprice of patients; with the constitutions of some it may even disagree. In such cases, the parts affected may be rubbed with spirit of wine, linimentum saponis, tinctura myrrhæ, or a strong solution of alum, or vinegar. A mixture of oleum terebinthinæ and balsamum copaivæ, in equal parts, is a celebrated application. A mixture of two parts of camphorated spirit of wine, and one of the aqua lithargyri acetati, has also been praised.

When chilblains have suppurated and ulcerated, the sores require stimulating dressings, such as lint dipped in a mixture of the aqua lithargyri acetati, and aqua calcis; in tinctura myrrhæ, or warm vinegar. If a salve be employed, one which contains the hydrargyrus nitratus ruber, is best. Ulcers of this kind frequently require being touched with the argentum nitratum, or dressed with a solution of it.

Chilblains, attended with sloughing, should be poulticed, till the dead parts are detached. The sores should then be first dressed with some mildly stimulating ointment, such as the unguentum resinæ flavæ. With this, in a day or two, a little of the hydrargyrus nitratus ruber may be mixed; but the surgeon should not venture on the employment of very irritating applications, till he sees what the parts will bear, and whether such will be requisite at all. Were he too bold, imme-

diately he leaves off the poultices, he might even bring on sloughing again.

The reader may find a long list of applications for chilblains in Rees's Cyclopædia, article Chilblains. See also Richter's Anfangsgr. der Wundarzn. Band. 1.

CHIMNEY-SWEEPER'S CANCER. See *Scrotum*.

CHORDEE. (French, from χορδὴ, a cord.) When inflammation is not confined merely to the surface of the urethra, but affects the corpus spongiosum, it produces in it an extravasation of coagulable lymph, as in the adhesive inflammation, which uniting the cells together, destroys the power of distention of the corpus spongiosum urethræ, and makes it unequal in this respect to the corpora cavernosa penis, and therefore a curvature takes place at the time of an erection, which is called a *chordee*. The curvature is generally in the lower part of the penis. When the chordee is violent, the inner membrane of the urethra is so much upon the stretch, that it may be torn, and cause a profuse bleeding from the urethra, that often relieves the patient, and even sometimes proves a cure. (*Hunter on the Venereal.*)

This is the *inflammatory* chordee; there is another kind, which has been named *spasmodic*.

In the beginning of the inflammatory chordee, bleeding from the arm is often of service; but it is more immediately useful to take away blood from the part itself by leeches; for we often find, that when a vessel gives way, and bleeds a good deal, the patient is greatly relieved. Relief may often be obtained by exposing the penis to the steam of hot water. Poultices have also beneficial effects; and both fomentations and poultices will often do more good when they contain camphor. Opium, given internally, is of singular service; and if it be joined with camphor, the effect will be still greater.

When the chordee continues after all inflammation is at an end, no evacuations are required. The consequence of the inflammation will cease gradually by the absorption of the extravasated coagulating lymph. Mercurial ointment rubbed on the part will considerably promote this event. Cicuta has seemed to do considerable good, after the common methods of cure have not availed. Electricity may be of service. A chordee is often longer in going off, than any other consequence of a gonorrhœa, but it disappears at last.

Camphorated mercurial ointment is better than the simple unguentum hydrargyri, to bring about the removal of the extravasated lymph.

The *spasmodic chordee* is very much benefited by bark. (*Hunter on the Venereal.*)

CHRONIC. (from χρονος, time.) *Chronicus*. Of long continuance; opposed to acute.

CHYLOPOIETIC ORGANS, or VISCERA. The parts of the body concerned in the preparation of the chyle, as the liver, gall bladder, pancreas, small intestines, &c. These viscera, with the stomach, compose what some surgical authors name the *gastric system*, and a disordered state of their functions is supposed to be the cause of many medical and surgical diseases. The continental surgeons, perhaps, extend this doctrine beyond the bounds of truth. In our own country, Mr. Abernethy has lately drawn the attention of practitioners to the subject by a publication, which has excited considerable interest and discussion throughout the profession.

CHYMOSIS. See *Chemosis*.

CICATRISANTIA. (from *cicatrico*, to skin over.) Epulotic medicines, or such as dispose wounds and ulcers to heal, and become covered with skin.

CICATRIX. The scar remaining on the skin, after the healing of a wound or ulcer.

CICATRIZATION. The process by which wounds and sores heal. Granulations having been formed, the next object of nature is to cover them with skin. The parts which had receded by their natural elasticity, in consequence of the breach made in them, now begin to be brought together by the contraction of the granulations. The contraction takes place in every point, but principally from edge to edge, which brings the circumference of the sore towards the centre, so that the sore becomes smaller and smaller, even although little, or no new skin is formed.

The contracting tendency is in some degree proportioned to the general healing disposition of the sore, and looseness of the parts. When granulations are formed upon a fixed surface, their contraction is mechanically impeded; as, for instance, on the skull, the shin, &c. Hence, in all operations on such parts, as much skin should be saved as possible.

When there has been a loss of substance, making a hollow sore, and the contraction of the granulations has begun, and made a good deal of progress, before they have had time to rise as high as the skin, then the edges of the skin are generally drawn down, and tucked in by it, in the hollow direction of the surface of the sore.

The contraction of the granulations continues, till the healing is complete; but it is greatest at first. That there is a mechanical resistance to such contraction, is proved by the assistance, which

may be given to the process by the application of a bandage.

Besides the contractile power of the granulations, there is also a similar power in the surrounding edge of the cicatrizing skin, which assists the contraction of the granulations, and is generally more considerable than that of the granulations themselves, drawing the mouth of the wound together, like a purse. The contractile power of the skin is confined principally to the very edge, where it is cicatrizing, and, as Mr. Hunter believed, to those very granulations, which have already cicatrized; for, the natural or original skin surrounding this edge does not contract, or at least not nearly so much, as appears by its having been thrown into folds and plaits, while the new skin is smooth and shining.

The uses of the contraction of granulations are various. It facilitates the healing of a sore, as there are two operations going on at the same time, viz. contraction and skinning.

It avoids the formation of much new skin, the advantage of which is evident; for it is with the skin as with all other parts of the body, viz. that such as are originally formed are much fitter for the purposes of life, than those that are newly formed, and not nearly so liable to ulceration.

When the whole surface of a sore has skinned over, the substance, the remains of the granulations, on which the new skin is formed, still continues to contract, till hardly any thing more is left than what the new skin stands upon. This is a very small part, in comparison with the first formed granulations, and it in time loses most of its apparent vessels, becoming white and ligamentous. All new healed sores are at first redder than the common skin, but in time they become much whiter.

As the granulations contract, the surrounding old skin is stretched to cover the part, which had been deprived of skin.

When a sore begins to heal, the surrounding old skin, close to the granulations, becomes smooth, and rounded with a whitish cast, as if covered with something white. This, Mr. Hunter supposed to be a beginning cuticle, and it is as early and sure a symptom of healing as any. While the sore retains its red edge all round, for perhaps a quarter, or half an inch in breadth, we may be certain it is not a healing one.

Skin is a very different substance, with respect to texture, from the granulations upon which it is formed; but it is not known, whether it is a new substance formed by the granulations, or a change in the surface of the granulations themselves.

The new skin most commonly takes its rise from the surrounding old skin, as if elongated from it; but not always. In very large sores, but principally old ulcers, in which the edges of the surrounding skin have but little tendency to contract, and the cellular membrane underneath to yield, or the old skin to become drawn over the ulcerated surface, the nearest granulations do not acquire a cicatrizing disposition. In such cases, new skin forms in different parts of the ulcer, standing on the surface of the granulations, like little islands.

Whatever change the granulations undergo to form new skin, they are generally guided to it by the surrounding skin, which gives this disposition to the surface of the adjoining granulations.

The new-formed skin is never so large as the sore was, on which it is formed, owing to the contraction of the granulations, and the yielding of the surrounding old skin. If the sore is situated where the adjoining skin is loose, as in the scrotum, then the contractile power of the granulations being quite free from obstruction, a very little new skin is formed; but if the sore is situated where the skin is fixed or tense, the new skin is nearly as large as the sore.

The new skin is at first commonly on the same level with the old. This however is not the case with scalds and burns, which frequently heal with a cicatrix, higher than the skin, although the granulations have been kept from rising higher than this part.

The new-formed cutis is neither so yielding nor so elastic as the original is; it is also less moveable. It gradually becomes, however, more flexible and loose. At first it is very thin and tender, but it afterwards becomes firmer and thicker. It is a smooth continued skin, not formed with those insensible indentations, which are observed in the natural or original skin, and by which the latter admits of any distention, which the cellular membrane itself will allow of.

This new cutis, and indeed all the substance which had formerly been granulations, is not nearly so strong, nor endowed with such lasting and proper actions, as the originally formed parts. The living principle itself is less active; for when an old sore breaks out, it continues to yield, till almost the whole of the new-formed matter has been absorbed, or has mortified.

The young cutis is extremely full of vessels; but these afterwards disappear, and the part becomes white.

The surrounding old skin, being drawn

toward the centre by the contraction of the granulations, is thrown into loose folds, while the new skin itself seems to be upon the stretch, having a smooth shining appearance.

The new cuticle is more easily formed from the cutis, than the cutis itself from granulations. Every point of the surface of the cutis is concerned in forming cuticle, so that this is forming equally every where at once; but the formation of the cutis is principally progressive from the adjoining skin.

The new cuticle is at first very thin, and rather pulpy than horny. As it becomes stronger, it looks smooth and shining, and is more transparent than the old cuticle.

The rete mucosum is later in forming than the cuticle, and in some cases never forms at all. In blacks who have been wounded, or blistered, the cicatrix is a considerable time before it becomes dark; and in one black, whom Mr. Hunter saw, the scar of a sore, which had been upon his leg when young, remained white when he was old. Many cicatrices of blacks, however, are even darker than any other parts of the skin. (*Hunter on the Blood, Inflammation, &c.*)

CICUTA. (*Conium Maculatum. Hemlock.*) This is a medicine, to which my observations in practice incline me to impute considerable efficacy in several surgical diseases. However, there is no doubt, that when it is represented as a certain cure for cancer, and scrofula, exaggeration is employed. It is an excellent remedy for irritable painful sores of the scrofulous kind, and it will complete the cure of many ulcers, in which the venereal action has been destroyed by mercury, though the healing does not proceed in a favourable way. Cicuta is likewise beneficial to several inveterate malignant sores, particularly, some which are every now and then met with upon the tongue. It is an eligible alterative in cases of noli me tangere, tinea capitis, and various herpetic affections. I have seen some enlargements of the female breast give way to hemlock conjoined with calomel. Some swellings of the testes also yield to the same medicines. Cicuta certainly has not the power of curing cancer; but, its narcotic anodyne qualities tend to lessen the pain of that distemper, so as to render it by no means a contemptible remedy in that intractable kind of case.

Respecting hemlock, Mr. Pearson observes, that the extract and powder may be sometimes given with evidently good effect in spreading irritable sores; whether they are connected with the active state of the venereal virus, or whether they remain after the completion of the mercurial course; and it would seem, that the benefit, conferred by this drug, ought not to be ascribed solely to its anodyne qualities, since the same advantages cannot always be obtained by the liberal exhibition of opium, even where it does not disagree with the stomach. He states, that cicuta is almost a specific for the venereal ulcers, which attacks the toes at their line of junction with the foot, and which frequently become gangrenous. Also, in spreading sores, which are accompanied with great pain, and no appearance of remarkable debility, hemlock will often do more than bark, vitriol, or cordials. (*Pearson on Lues Venera.*) The common mode of exhibiting hemlock is in the form of pills, made of the extractum conii, five grains to each. However, I have always thought three grains sufficient to begin with, the dose being afterwards gradually augmented. It is curious how large a quantity may at last be taken in this manner. Mr. J. Wilson, in his Pharmacopœia Chirurgica, informs us of a remarkable case of a cancerous ulcer, for which the patient took a hundred and twenty pills, each consisting of five grains of the extractum conii, in twenty-four hours, and this without any benefit being produced, or any inconvenience to the patient.

The stomach being a little disordered, and the head somewhat giddy, is a sign of the dose being sufficiently strong.

"According to some writers, but more particularly Dr. Withering, there are several ways in which the views of a medical practitioner, in prescribing this remedy, may be frustrated. The plant chosen for preparing the extract, may not be the true *conium maculatum*, which is distinguished by red spots along the stalk. It may not be gathered when in perfection, namely, when beginning to flower. The inspissation of the juice may not have been performed in a water-bath, but, for the sake of dispatch, over a common fire. The leaves, of which the powder is made, may not have been cautiously dried and preserved in a well stopped bottle; or if so, may still not have been guarded from the ill effects of exposure to light. Or, lastly, the whole medicine may have suffered from the mere effects of long keeping. From any of these causes, it is evident, the powers of cicuta may have suffered; and it happens, no doubt, very frequently, that the failure of it ought, in fact, to be attributed to one or other of them." (*Pharmacopœia Chirurgica, published* 1802, *p.* 174.)

I have sometimes prescribed as an alterative, with manifest benefit in several surgical diseases, a pill, containing

three grains of extractum conii, one of hydrargyri submurias (calomel,) and one of antimonii sulphuretum præcipitatum.

CILLOSIS. (from *cilum*, the eye-lid.) A spasmodic trembling of the eye-lids.

CINCHONA. As one of the designs of this dictionary is to embrace the subjects of a surgical pharmacopœia, peruvian bark, which is administered in a multiplicity of surgical cases, cannot be passed over in silence.

Its great repute for its virtues in stopping mortifications, and accelerating the separation of the sloughs, every person, whether of the medical profession or not, has frequently heard of. Indeed, so high is the character of the medicine, that many practitioners order it in some stage, or another, of almost every distemper, often prescribe it when it is totally useless, give it when it actually does harm, and make their patients swallow such quantities as operate perniciously, when smaller doses would effect striking benefit. Some men are credulous enough to think, that from the peruvian bark vigor and strength are directly extricated, and infused into the constitution, in exact proportion to the quantity of the medicine, which the stomach will keep down and digest.

While a doctrine of this sort prevails, we must expect to see indiscriminate and erroneous practice. The generality of diseases will always be attended with an appearance of languor and weakness, and, certainly, while there exists a supposition, that a drug is at hand, possessing the quality of evolving and communicating strength, it would be absurd to fancy, that so important an article will not be largely exhibited in a multiplicity of surgical cases. I shall not presume to hazard an idea of the powers of the peruvian bark in the practice of physic; but, I have not the least doubt, that they have been unwarrantably exaggerated in surgery, so as to blind and prejudice many a practitioner of good abilities, and lead him to adopt injudicious and hurtful methods of treatment.

Under particular circumstances, bark has undoubtedly the quality of increasing the tone of the digestive organs; and, of course, whenever the indication is to strengthen the system by nourishing food, and the appetite fails, this medicine may prove of the highest utility, provided it is given in moderate doses, and it appears to agree with the stomach and bowels. But, the plan of making the patient swallow as much of the medicine as can be got into his stomach, must, in my opinion, be invariably followed by bad, instead of good effects. How can it be reasonably expected, that the stomach, which is already out of order, can be set right by having an immoderate quantity of any drug whatever forced into it? In fact, if the alimentary canal were in a healthy state, must not such practice be likely to throw it into a disordered condition?

Bark is an excellent medicine, when judiciously administered; but, like every other good medicine, in bad hands, it may be the means of producing the worst consequences. How much good does mercury effect in an infinite number of surgical diseases, when prescribed by a surgeon of understanding; what a poison it becomes under the direction of an ignorant practitioner! With respect to cases of mortification, bark is often most strongly indicated, when the sloughing is not surrounded with active inflammation, when the patient is debilitated, and his stomach cannot take nutritious food. I have always regarded the notion of giving bark, as a specific for gangrene, as totally unfounded and absurd. I have watched its effects in these cases, and could never discern, that it had the least peculiar power of operating directly upon the parts, which are distempered. Whatever good it does, is by its improving the tone of the digestive organs, and making them more capable of conveying nourishment, and, of course, strength into the constitution.

I should feel myself guilty of a degree of presumption in speaking thus freely upon this subject, were not my sentiments in some measure supported by those of certain surgical writers, the remembrance of whom will always be hailed with unfeigned veneration and esteem. Mr. Samuel Sharp was not bigotted to bark, and, while he allowed it to possess a share of efficacy, he would not admit, that it was capable of miraculously accomplishing every thing, which the ignorant or prejudiced alleged. "I know," says he, "it will be looked upon by many, as a kind of scepticism, to doubt the efficacy of a remedy, so well attested by such an infinity of cases; and, yet, I shall frankly own, I have never clearly to my satisfaction, met with any evident proofs of its preference to the cordial medicines usually prescribed; though I have a long time made experiment of it with a view to search into the truth.

"Perhaps, it may seem strange, thus to dispute a doctrine established on what is called matter of fact; but, I shall here observe, that in the practice of physic and surgery, it is often exceedingly difficult to ascertain a fact. Prejudice, or want of abilities, sometimes misleads us in our judgment, where there is evidently a right and a wrong; but, in certain cases, to distinguish how far the remedy, and how far nature operate, is probably above our discernment. In gangrenes, particularly, there is frequently such a complication of unknown circumstances, as can-

not but tend to deceive an unwary observer. Mortifications arising from mere cold, compression, or stricture, generally cease upon removing the cause, and are, therefore seldom proper cases for proving the power of the bark. However, there are two kinds of gangrene, where internals have a fairer trial; those are a spreading gangrene from an internal cause, and a spreading gangrene from violent external accidents, such as gunshot wounds, compound fractures, &c. Yet, even here we cannot judge of their effect with absolute certainty; for, sometimes, a mortification from internal causes is a kind of critical disorder. There seems to be a certain portion of the body destined to perish, and no more; of this we have an infinity of examples brought into our hospitals, where the gangrene stops at a particular point, without the least assistance from art. The same thing happens in the other species of gangrene from violent accidents, where the injury appears to be communicated to a certain distance, and no farther; though, by the way, I shall remark in this place, contrary to the received opinion, that gangrenes from these accidents, (where there has been no previous straitness of bandage,) are as often fatal, as those from internal causes.

"As I have here stated the fact, we see how difficult it is to ascertain the real efficacy of this medicine; but, had bark in any degree, those wonderful effects in gangrenes, which it has in periodical complaints, its pre-eminence would no more be doubted in the one case, than in the other. What, in my judgment, seems to have raised its character so high, are the great numbers of single observations published on this subject, the authors of which not having frequent opportunities of seeing the issue of this disorder, under the use of cordials, &c. and some of them, perhaps, prejudiced with the common supposition, that every gangrene is of itself mortal, have therefore ascribed a marvellous influence to the bark, when the event has proved successful."—(*Sharp's Crit. Enq. chap.* 8, *on Amputation.*)

Some further remarks on this subject will be reserved for the article *Mortification.*

According to Mr. Bromfield, bark is a specific for old ulcers, where the inflammation seems circumscribed at the distance of an inch round the sore, the surface of the ulcers looks glossy, and the discharge is extremely thin and very offensive, with little or no sleep, from the violence of the pain. He further observes, that the addition of opium, as circumstances may require, will often be found necessary. (*Chirurgical Observations and Cases, Vol.* I, *p.* 132.)

Bark is given so extensively in the practice of surgery, that there are few important cases, in which in certain circumstances, and at some period or another, it is not indicated. When persons have been weakened by a course of mercury, or by the effects of any disease whatsoever, moderate doses of bark will frequently be found of great service. But, it only becomes so on the principles above suggested, and, as far as my judgment extends, this medicine should never be prescribed in any surgical cases in excessive and unreasonable quantities.

The yellow bark, or the cortex cinchonæ cordifoliæ of the new pharmacopœia, is said to possess more efficacy, than the other kinds.

CINCLE'SIS, CINCLI'SIS, or CINCLI'SMOS. An involuntary winking, or trembling motion of the eyelids.

CINNABAR, ARTIFICIAL. (*Hydrargyri Sulphuretum rubrum.*) Is chiefly employed by surgeons for fumigating venereal ulcers. An apparatus is sold in the shops for this purpose. The powder is thrown upon a heated iron, and the smoke is conducted by means of a tube to the part affected.

CINZILLA. (*Zona.*) A kind of herpes surrounding the body like a girdle.

CI'ON. Hippocrates uses the word κιων, to denote a fleshy excrescence in the pudendum muliebre.

CIONIS. (from κιων, the uvula.) A diseased and painful enlargement of the uvula.

CIRCUMCISION. (from *circumcido*, to cut round.) The operation of cutting off a circular piece of the prepuce, sometimes practised in cases of phymosis. (See *Phymosis.*)

CIRSOCELE. (from κιρσος, a varix, and κηλη, a tumour.) The cirsocele is a varicose distention and enlargement of the spermatic vein; and whether considered on account of the pain, which it sometimes occasions, or on account of a wasting of the testicle, which, now and then follows it, may truly be called a disease. It is frequently mistaken for a descent of a small portion of omentum. The uneasiness which it occasions, is a dull kind of pain in the back, generally relieved by suspension of the scrotum. It has been resembled to a collection of earthworms; but whoever has an idea of a varicose vessel, will not stand in need of an illustration by comparison. It is most frequently confined to that part of the spermatic process, which is below the opening in the abdominal tendon; and the vessels generally become rather larger, as they approach the testis. Mr. Pott never knew any good effect from external applications of any kind.

In general the testicle is perfectly un-

concerned in, and unaffected by, this disease; but it sometimes happens, that it makes its appearance very suddenly, and with acute pain, requiring rest and ease; and sometimes after such symptoms have been removed, Mr. Pott has seen the testicle so wasted as hardly to be discernible. He has also observed the same effect from the injudicious application of a truss to a true cirsocele; the vessels, by means of the pressure, became enlarged to a prodigious size, but the testicle shrunk to almost nothing. (*Pott's Works, Vol.* 2.)

The cirsocele is more frequently than any other disorder, mistaken for an omental hernia. As Mr. Astley Cooper remarks, when large it dilates upon coughing; and it appears in an erect, and retires in a recumbent, posture of the body. There is only one sure method of distinguishing the two complaints: place the patient in a horizontal posture, and empty the swelling by pressure upon the scrotum; then put the fingers firmly upon the upper part of the abdominal ring, and desire the patient to rise; if it is a hernia, the tumour cannot re-appear, as long as the pressure is continued at the ring; but if a cirsocele, the swelling returns with increased size, on account of the return of blood into the abdomen being prevented by the pressure. (*A. Cooper on Inguinal Hernia.*)

The cirsocele can generally only be palliated, and seldom radically cured. When the complaint is attended with pain, cold saturnine, and alum, lotions may be applied to the testicle and spermatic cord. At the same time, blood should be repeatedly taken away by means of leeches; the bowels should be kept gently open; the patient should be placed in a horizontal posture; and the testicle should be supported in a bag-truss.

In general, the patient only finds it necessary to keep up the testicle by this kind of suspensory bandage.

Gooch, and other writers, have related cases of cirsocele, in which the pain was so intolerable and incurable, that nothing but castration could afford the patient any relief.

CIRSOS. (from κιρσοω, to dilate.) A varix, or preternatural distention of any part of a vein.

CLAP. (See *Gonorrhœa*).

CLAUDICATIO. (from *claudico*, to halt.) Halting or limping.

CLAVICLE. (*dim.* of *clavis*, a key.) *Clavicula* or *Claviculus*. The collar-bone, so named from its likeness to an ancient key. (See *Dislocations* and *Fractures*.)

CLAVUS. (a nail). In Amatus Lusitanus, a kind of instrument for enabling persons with carious palates, to articulate better. Also, a hard tubercle in the uterus. Clavus besides signifies the common little tumour well known by the name of corn. (See *Corns.*)

CLITORISMUS. (from κλειτορις, the clitoris.) A morbid enlargement of the clitoris.

CLUNESIA. (from *clunes*, the buttocks.) An inflammation of the buttocks.

CLYSTER. (from κλυζω, to cleanse.) *Clysma, Clysterium.* An enema, or liquid injected into the anus. (See *Enema.*)

COALESCENCE. (from *coalesco*, to grow together.) *Coalescentia.* The union or growing together of parts, which before were separated.

COCCYX, Fractures and Dislocations of. (See *Fracture* and *Dislocation*).

CODESE'LLA. A carbuncle.

CODOCELE. (from κωδια, a bulb, and κηλη, a tumour.) A bubo.

CŒLOMA. (from κοιλος, hollow.) A round hollow ulcer on the cornea.

COLIC, usually denotes pain in the abdomen, especially about the navel, with vomiting and costiveness; but, physicians discriminate several species of the affection.

COLLIQUATIVE SWEAT. A profuse symptomatic perspiration. A diarrhœa of this sort is sometimes termed *colliquative.*

COLLISION. (from *collido*, to beat together.) When any part of the body, and some hard substance are driven at the same time against each other, a collision is said to take place.

COLLOBOMA. (from κολλαω, to glue together.) An adhesion between the eyelids.

COLLUTORIUM. (from *colluo*, to cleanse.) A gargle, or wash for the mouth.

COLLUVIES. (from *colluo*, to cleanse.) The discharge from an old sore.

COLLYRIS. (κολλωρις, a little round cake.) A bump caused by a blow.

COLLYRIUM. (from κωλυω, to restrain, because it stops the inflammation.) An application to the eyes, and generally an eye-water.

The following are some of the most useful collyria.

COLLYRIUM ACIDI ACETICI. ℞ Aceti Distillati ℥j. Spiritus Vini Tenuioris ℥ss. Aq. Rosæ ℥viij. Misce. The strength to be diminished, or increased, as circumstances may require. This collyrium is recommended for weak watery eyes, and for relieving pain in these organs, after exerting them on any objects. It is also said to be useful for the scrofulous ophthalmy. (See *Wilson's Pharm. Chir. p.* 66.)

COLLYRIUM ALUMINIS. ℞. Aluminis purif ℈j. Aq. rosæ ℥vj. This is a good astringent collyrium, employed at Guy's Hospital.

COLLYRIUM AMMONIÆ ACETATÆ. ℞. Aq. ammon. acet. Aq. rosæ sing. ℥j. M.

COLLYRIUM AMMONIÆ ACETATÆ CAMPHORATUM. ℞. Collyrii ammon. acet. Misturæ camphoratæ sing. ℥ij. M.

COLLYRIUM AMMONIÆ ACETATÆ OPIATUM. ℞. Collyrii ammon acet. ℥iv. Tinct. opii. gutt. xl. M.

COLLYRIUM CERUSSÆ ACETATÆ. ℞. Aquæ rosæ ℥vj. Cerussæ Acetatæ ℥ss. Misce. This is a good application to the eyes, when one of a gently astringent, cooling quality is indicated.

COLLYRIUM CUPRI VITRIOLATI CAMPHORATUM. ℞. Aq. Cupri vitriolati camphoratæ ℥ij. Aq. distillatæ ℥iv. M. Recommended by Mr. Ware, for the purulent ophthalmy of children.

COLLYRIUM HYDRARGYRI MURIATI. ℞. Hydrarg. muriati grss. Aq. distillat. ℥iv. M. This collyrium is fit to be employed, after the acute stage of the ophthalmy has for some time subsided, and it will disperse many superficial opacities of the cornea.

COLLYRIUM LITHARGYRI ACETATI. ℞. Aq. distillatæ ℥iv. Aq. litharg. acet. gutt. x. M.

COLLYRIUM OPIATUM. ℞. Opii Extracti gr. x. Camphoræ gr. vj. Aquæ distillatæ ferventis ℥ xii. Beat the two first ingredients together in a mortar, and mix the hot water gradually, and strain the fluid.

This collyrium is recommended in some ophthalmies attended with great pain and swelling. (See *Wilson's Pharm. Chir. p.* 70.)

COLLYRIUM ZINCI VITRIOLATI. Zinci vitriol. gr. v. Aq. distillatæ ℥iv. M. This is the most common collyrium of all: it may be gradually made stronger.

COLLYRIUM ZINCI VITRIOLATI CUM MUCILAGINE SEMINIS CYDONII MALI. ℞. Aq. plantaginis ℥iv. zinci vitriol. gr. v. et mucil. sem. cydon. mal. ℥ss. M.

In order to check the morbid secretion from the eye-lids, in cases of the fistula lachrymalis, or what Scarpa calls *il flusso palpebrale puriforme*, this celebrated Professor recommends a few drops of the above collyrium to be insinuated between the eye-lids and eye.

COLON, *Fruit Stones lodged in.* (See *Alvine Concretions.*)

COLPOCELE. (from κολπος, the vagina, and κηλη, a tumour.) A tumour, or hernia, situated in the vagina.

COLPOPTOSIS. (from κολπος, the vagina, and πιπτω, to fall down.) A bearing or falling down of the vagina. (See *Vagina, Prolapsus of.*)

COMA. (from κω or κεω, to lie down.) Anciently any total suppression of the powers of sense; but now it means a lethargic drowsiness. It is a symptom of several surgical disorders.

COMATOSE. *Comatosus.* Lethargic.

COMMINUTED. (from *comminuo*, to break in pieces.) A fracture is termed *comminuted*, when the bone is broken into several pieces.

COMPRESS. (from *comprimo*, to press upon.) *Compressa.* A compress. Folded linen, lint, or other materials, making a sort of pad, which surgeons place over those parts of the body on which they wish to make particular pressure, and, for this purpose, a bandage is usually applied over the compress. Compresses are also frequently applied to prevent the ill effects, which the pressure of hard bodies, or tight bandages, would otherwise occasion.

COMPRESSION OF THE BRAIN. (See *Head, Injuries of.*)

CONCUSSION. (from *concutio*, to shake together.) *Concussio.* A concussion, or shock.

CONCUSSION OF THE BRAIN. (See *Head, Injuries of.*)

CONDUCTOR. (from *conduco*, to guide.) A surgical instrument for directing the knife in certain operations. It is more commonly called a *director.*

CONDYLOMA. (from κονδυλος, a tubercle, or knot.) A small very hard tumour. The term is generally applied to excrescences of this description about the anus. The practitioner may either destroy them with the lapis infernalis, tie their base with a ligature, so as to kill them, or remove them at once, with a knife: the first is generally the worst; the last the best and most speedy method.

CONGESTION. (from *congero*, to amass.) *Congestio.* A collection of pus, particularly one of the chronic kind.

CONGLUTINANTIA. (from *conglutino*, to glue together.) Such medicines as heal and unite parts.

CONIUM MACULATUM. Hemlock. (See *Cicuta.*)

CONSTIPATION. (from *constipo*, to crowd together.) *Constipatio.* Costiveness.

CONTRA-APERTURA. (from *contra*, against, and *aperio*, to open.) A counter-opening. An opening made opposite to one that already exists.

CONTRA-FISSURA. (from *contra*, against, and *findo*, to cleave.) A crack in the skull opposite to the part on which the blow was given.

CONTUSED WOUNDS. See *Wounds.*

CONTUSION. (from *contundo*, to bruise.) *Contusio.* A bruise.

Slight bruises seldom meet with much attention; but when they are severe, very

bad consequences may ensue, and these are the more likely to occur, when such cases are not taken proper care of.

In all severe bruises, besides the inflammation which the violence necessarily occasions, there is an instantaneous extravasation, in consequence of the rupture of many of the small vessels of the part. In no other way can we account for those very considerable tumours, which often rise immediately after injuries of this nature. The black and blue appearance, instantly following many bruises, can only be explained by their being an actual effusion of blood from the small vessels, which have been ruptured. Even largish vessels are frequently burst in this manner, and very considerable collections of blood are the consequence. Blows on the head very often cause a large effusion of blood under the scalp. I have seen four or five ounces thus extravasated.

Besides the rupture of an infinite number of small vessels and extravasation, which attend all bruises, in a greater or less degree, the tone of the fibres and vessels which have suffered contusion, is considerably disordered. Nay, the violence may have been so great, that the parts are from the first deprived of vitality, and must slough.

Parts at some distance from such as are actually struck, may suffer greatly from the violence of the contusion. This effect is what the French have named a *contre-coup*.

The bad consequences of bruises are not invariably proportioned to the force which has operated; much depends on the nature and situation of the part. When a contusion takes place on a bone, which is thinly covered with soft parts, the latter always suffer very severely, in consequence of being pressed, at the time of the accident, between two hard bodies. Hence, bruises of the shin so frequently cause sloughing and troublesome sores. Contusions affecting the large joints are always serious cases; the inflammation occasioned is generally obstinate, and abscesses and other diseases, which may follow, are consequences truly enough to excite alarm.

In the treatment of bruises, the practitioner has three indications, which ought successively to claim his attention, in the progress of such cases.

The first is to prevent and diminish the inflammation, which, from the violence done, must be expected to arise. The bruised parts should be kept perfectly at rest, and be covered with linen, constantly wet with the lotio aq. litharg. acet. When there are muscles bruised, they are to be kept in a relaxed position, and never used.

If the bruise should have been very violent, it will be proper to apply leeches, and this repeatedly, and even, in some cases, particularly, when joints are contused, to take blood from the arm. In every instance, the bowels should be kept well open with saline purgatives.

A second object in the cure of contusions, is to promote the absorption of the extravasated fluid by discutient applications. These may at once be employed in all ordinary contusions, not attended with too much violence; for then nothing is so beneficial as maintaining a continual evaporation from the bruised part, by means of the cold saturnine lotion, and, at the same time, repeatedly applying leeches. In common bruises, however, the *lotio ammoniæ muriatæ* (see *this article*) is an excellent discutient application; but most surgeons are in the habit of ordering liniments for all ordinary contusions, and certainly they do so much good in accelerating the absorption of the extravasated blood, that the practice is highly praiseworthy. The linimentum saponis, or the linimentum camphoræ, are as good as any that can be employed. (See *Linimentum*.)

In many cases, unattended with any threatening appearances of inflammation, but in which there is a good deal of blood and fluid extravasated, bandages act very beneficially, by the remarkable power which they have of exciting the action of the lymphatics, by means of the pressure which they produce.

A third object in the treatment of contusions, is to restore the parts to their proper tone. Rubbing the parts with liniments has a good deal of effect in this way. But, notwithstanding such applications, it is often observed, that bruised parts continue for a long while weak, and even swell, and become œdematous, when the patient takes exercise, or allows them to hang down, as their functions in life may require. Pumping cold water two or three times a day, on a part thus circumstanced, is the very best measure which can be adopted. A bandage should also be worn, if the situation of the part will permit. These steps, together with perseverance in the use of liniments, and in exercise gradually increased, will soon bring every thing into its natural state again.

CORACOID PROCESS OF THE SCAPULA, FRACTURED. (See *Fracture. Fractures of the Scapula.*)

CORNEA TUNICA. (from *cornu*, a horn.) The anterior transparent convex part of the eye, which in texture is tough, like horn. It has a structure peculiar to itself, being composed of a number of concentric cellular lamellæ, in the cells of which is deposited a particular sort of

fluid. It is covered externally by a continuation of the conjunctiva, which belongs to the class of mucous membranes; and it is lined by a membrane, the tunica humoris aquei, which seems to belong to the serous class.

FLESHY EXCRESCENCES OF THE CORNEA.

Mr. James Wardrop, in his Essays on the Morbid Anatomy of the Human Eye, has published an excellent chapter on this subject. Besides pterygia, which are treated of in another part of this Dictionary, Mr. Wardrop states, that the cornea is subject to two kinds of caruncles, or fleshy excrescences. One appears at birth, or soon after it, and resembles the nævi materni so frequent on the skin of various parts of the body. The second is described, as having a greater analogy to the fungi, which grow from mucous surfaces, and being in general preceded by ulceration.

Of the congenital excrescence of the cornea, Mr. Wardrop has seen two remarkable instances. The first was in a girl, eight, or ten years of age, on whose left eye, there was a conical mass, the base of which grew from about two-thirds of the cornea, and a small portion of the adjoining sclerotic coat.

The second example occurred in a patient upwards of fifty years old. The tumour had been observed from birth, was about as large as a horse-bean, and only a small portion of it seemed to grow from the cornea. The other part was situated on the white of the eye, next the temporal angle of the orbit. From the middle of the excrescence, upwards of twelve long firm hairs grew, and hung over the cheek.

Mr. Wardrop acquaints us, that a similar tumour, with two hairs growing out of it, was seen at Lisbon by Dr. Barron, of St. Andrews. Mr. Crampton also mentions, that he once saw a "tuft of very strong hairs proceeding from the solerotica." (*Essay on the Entropeon, p.* 7.) And De Gazelles met with an instance, in which a single hair grew from the cornea. (*Journ. de Médecine, Tom.* 24.) According to Mr. Wardrop, this species of excrescence of the cornea greatly resembles the spots, covered with hair, which are frequent on various parts of the surface of the body.

With regard to the second kind of tumour growing from the cornea, a fungus, proceeding from an ulcer of this part of the eye, is stated to be very uncommon. However, it is said, that, when a portion of the iris protrudes through an ulcer of the cornea, the growth of a large excrescence from the projecting part is not so unusual. Of such a disease, Mr. Wardrop has cited an example from Máitre Jan's Traité des Maladies des yeux. Voigtel, Beer, and Plaichner. Excrescences, growing from the cornea, are also quoted from the following works; Handbuch der Pathologischen Anatomie, Von F. G. Voigtel, Halle, 1804. Pratische Beobachtungen über den grauen Staar und die Krankhieten der Hornhaut, von Joseph Beer, Vienna, 1791. Plaichner's Dissertatio, de Fungo Oculi. (See *Wardrop's Essays on the Morbid Anatomy of the Human Eye, chap.* 4.)

The only treatment, which excrescences of the cornea admit of, is to remove them with a scalpel and pair of forceps, or to destroy them with caustic.

ABSCESSES OF THE CORNEA.

The following description of abscesses of the cornea is taken from Mr. Wardrop's valuable work on the morbid anatomy of the eye.

When the matter is collected between the lamellæ of the cornea, it first appears like a small spot; and, instead of resembling a speck in colour, it is of the yellow hue of common pus. As the quantity of the matter increases, this spot becomes broader, and it does not alter its situation from the position of the head. If it is situated among the external layers of the cornea, or immediately below the corneal conjunctiva, a tumour is formed anteriorly, and, if touched with the point of a probe, the contained fluid can be felt fluctuating within, or if the eye is looked at sideways, an alteration in the form of the cornea may be readily perceived.

When the matter collects, between the interior lamellæ, it does not produce any evident alteration, in the external form of the cornea; but, if it is touched with the point of a probe, a fluctuation can be more or less distinctly perceived, and the spot alters its form, and becomes somewhat broader.

Such collections of matter appear on every part of the cornea. Sometimes they alter their situation by degrees, and sink downwards; and sometimes they change both their situation and form. They very seldom cover more than one-fourth, or one-third of the cornea.

If the quantity of matter is small, it is often completely absorbed during the abatement of the inflammatory symptoms, and it generally leaves no vestige behind it. In other cases, the cornea is eroded externally, producing an ulcer, and subsequent opacity. In some few instances, the internal lamellæ of the cornea give way, and the matter escapes into the anterior chamber. If an artificial opening is made, in order to discharge the matter, it often does not readily flow out; and

it is sometimes so tenacious, and contained in a cavity so irregular, that it neither escapes spontaneously, nor can it be evacuated by art.

It is particularly to the cases, in which matter collects between the layers of the cornea, that the terms *unguis*, and *onyx*, are applied. (See *Wardrop's Essays on the Morbid Anatomy of the Human Eye, chap.* 6.)

OPACITIES OF THE CORNEA.

Opacity of the cornea is one of the worst consequences of obstinate chronic ophthalmy. Scarpa distinguishes the superficial and recent species of opacity from the *albugo* and *leucoma*, (see *these words*,) which are not in general attended with inflammation, assume a clear pearl colour, affect the very substance of the cornea, and form a dense speck upon this coat of the eye. The *nebula*, or slight opacity, here to be treated of, is preceded and accompanied by chronic ophthalmy; it allows the iris and pupil to be discerned through a kind of cloudiness, and consequently does not entirely bereave the patient of vision, but permits him to distinguish objects, as it were, through a mist. The nebula is an effect of protracted or illtreated chronic ophthalmy. The veins of the conjunctiva, much relaxed by the long continuance of the inflammation, become preternaturally turgid and prominent; afterwards they begin to appear irregular and knotty, first in their trunks, then in their ramifications, near the union of the cornea with the sclerotica, and lastly, in their most minute ramifications, returning from the delicate layer of the conjunctiva, spread over the cornea. It is only, however, in extreme relaxation of the veins of the conjunctiva, that these very small branches of the cornea become enlarged.

When this happens, some reddish streaks begin to be perceptible, in the interspaces of which, very soon afterwards, a thin milky albuminous fluid is effused, which dims the diaphanous state of the cornea. The whitish, delicate, superficial speck, thence resulting, forms precisely what is termed, *nebula*, or that kind of opacity here to be considered. And since this extravasation may happen only at one point of the cornea, or in more places, the opacity may be in one speck, or in several distinct ones, but which all together diminish, more or less, the transparency of this membrane.

The cloudiness of the cornea, which sometimes takes place in the inflammatory stage of the violent acute ophthalmy, essentially differs from the species of opacity expressed by the term *nebula*. The first is a deep extravasation of coagulating lymph into the internal cellular texture of the cornea, or else the opacity proceeds from an abscess between the layers of this membrane about to end in ulceration. On the other hand, the nebula forms slowly upon the superficies of the cornea, in the long protracted chronic ophthalmy; is preceded first by a varicose enlargement of the veins in the conjuctiva, next of those in the delicate lamina of this tunic, continued over the front of the cornea; and finally it is followed by an effusion of albuminous lymph into the texture of this thin layer, expanded over the transparent part of the eye. This effusion never elevates itself in the shape of a pustule. Wherever the cornea is affected with this species of opacity, termed *nebula*, the part of the conjunctiva, corresponding to it, is constantly occupied by a network of varicose veins, more knotty and prominent than other vessels of the same description, and though the cornea be clouded at more points than one, there are distinct corresponding fasciculi of varicose veins in the white of the eye. Scarpa injected an eye affected with chronic ophthalmy, and *nebula*, and he found that the wax easily passed, both into the enlarged veins of the conjunctiva, and of that part of the surface of the cornea where the opacity existed; the inosculations all round the margin of the cornea were beautifully variegated, without trespassing that line, which bounds the sclerotica, except on that side, where the cornea was affected with this species of opacity.

This kind of opacity of the cornea, from its very origin, requires an efficacious plan of treatment; for though at first it may only occupy a small portion of the cornea, when left to itself it advances towards the centre of this membrane, and the ramifications of the dilated veins upon this coat growing still larger, at length convert the delicate continuation of the conjunctiva upon the surface of the cornea, into a dense opaque membrane, obstructing vision, either partially or totally.

The curative indication in this disease is to make the varicose vessels resume their natural diameters, or if that be impracticable, to cut off all communication between the trunk of the most prominent varicose veins of the conjunctiva, and the ramifications coming from the surface of the cornea, the seat of the opacity. The first mode of treatment is executed by means of topical astringents and corroborants, especially Janin's ophthalmic ointment, and success attends it, when the opacity is in an early state, and not extensive. But when advanced to the centre of the cornea, the most infallible treatment is the excision of the fasciculus of varicose veins near their ramifications,

that is, near the seat of the opacity. By means of this excision, the blood retarded in the dilated veins of the cornea is voided; the varicose veins of the conjunctiva have an opportunity to contract and regain their tone, no longer having blood impelled into them; and the turbid secretion effused in the texture of the layer of the conjunctiva continued over the cornea, or in the cellular substance, connecting these two membranes, becomes absorbed. The celerity, with which the nebula disappears, after this operation, is surprising, commonly in twenty-four hours. The extent to which the excision of the varicose veins of the conjunctiva must be performed, depends upon the extent of the opacity of the cornea. Thus, should there be only one set of varicose vessels, corresponding to an opacity of moderate extent, it is sufficient to cut a portion of them away. Should there appear several dim specks upon the cornea, with as many distinct sets of varicose vessels, arranged round upon the white of the eye, the surgeon must make a circular incision into the conjunctiva, near the margin of the cornea, by which he will certainly divide every plexus of varicose vessels. But let it be observed, that a simple incision through the varicose vessels is not permanently effectual in destroying all direct communication between the trunks and ramifications of these vessels upon the cornea, after such an incision made, for instance, with a lancet; though it be true that a separation of the mouths of the divided vessels follows in opposite directions, it is no less true, that in the course of a few days after the incision, the mouths of the same vessels approximate each other, and inosculate, so as to resume their former continuity. Hence, to derive from this operation all possible advantage, it is essential to extirpate with the knife a small portion of the varicose plexus, together with the adherent particle of the tunica conjunctiva.

To do this operation properly, the plan of passing a needle threaded with silk through the varicose plexus is to be dispensed with. The eye-lids are to be separated from the affected eye by a skilful assistant, who is, at the same moment, to support the patient's head upon his breast. The surgeon is then to take hold of the varicose vessels, with a pair of small forceps, near the edge of the cornea, and to lift them a little up, which the lax state of the conjunctiva renders easy; then, with a pair of small curved scissars, he is to cut away the plexus of varicose vessels, together with a small piece of the conjunctiva, making the wound of a semilunar form, and, as near as possible to the cornea. If it should be necessary to operate upon more than one plexus of varicose vessels, situated at some distance apart, the surgeon must elevate them one after the other with the forceps, and remove them. But when they are very close together, and occupy every side of the eye, he must make an uninterrupted circular incision into the conjunctiva, guiding it closely to the margin of the cornea all round, thus dividing with the conjunctiva, all the varicose vessels.

This being done, he may allow the cut vessels to bleed freely; even promoting the hemorrhage by fomenting the eyelids, until the blood discontinues to flow. Then the eye is to be covered with an oval piece of the emplastrum saponis, and a retentive bandage. The eye ought not to be opened till twenty-four hours after the operation, when, usually, the opacity of the cornea will be found completely dispersed; and, during the ensuing days, the patient is to be enjoined to keep the eye shut, and covered with a bit of fine rag. A collyrium of milk and rose-water warm, may be applied two or three times a day. It is worthy of observation, when the inflammation of the conjunctiva happens, about the second or third day after the operation, particularly in cases in which the incision is made all round, that while the greater part of the sphere of the eye reddens, a whitish circle, in the place of the incision, forms a line of boundary to the redness which does not extend further upon the cornea. This inflammation of the conjunctiva, with the aid of internal antiphlogistic remedies, and topical emollients, abates in a few days, and then pus is secreted along the track of the incision in the conjunctiva. The wound contracts, and growing smaller and smaller, soon cicatrizes. Bathing the eye with warm milk and rose-water is the only local treatment necessary in this state of the complaint.

Thus not only the transparency of the cornea is revived, but also the preternatural laxity of the conjunctiva is diminished, or even removed. When afterwards the conjunctiva appears yellowish and wrinkled, the use of topical astringents and corroborants, and of Janin's ophthalmic ointment, will yet prove highly beneficial, in preventing the recurrence of the varicose state of the vessels. (*Scarpa sulle malattie degli occh.*)

For other opacities of the cornea refer particularly to *Albugo Leucoma*, and *Staphyloma*.

ULCER OF THE CORNEA.

This is a very common consequence of the bursting of a small abscess, which not unfrequently forms beneath the delicate layer of the conjunctiva continued over the cornea, or in the very substance of

the cornea itself, after violent ophthalmy. At other times, the ulcer of the cornea is produced by the contact of corroding matter, or sharp-pointed bodies insinuated into the eyes, such as quick lime, pieces of glass, or iron, thorns, &c. The little abscess of the cornea is attended with the same symptoms, as the severe acute ophthalmy; especially with a troublesome sensation of tension in the eye, eyebrow, and nape of the neck; with ardent heat; copious secretion of tears; aversion to light; intense redness of the conjunctiva, particularly near the point of suppuration. The inflammatory pustule, compared with similar ones, in any other part of the body, is slow in bursting after matter is formed. Experience has nevertheless evinced, that it is improper to puncture the small abscess; for, though it assumes the appearance of being perfectly maturated, the matter contained in it, is so tenacious, and adherent to the substance of the cornea, that not a particle issues out of the artificial aperture, and the wound exasperates the disease, increases the opacity of the cornea, and often occasions another small abscess to form in the vicinity of the first. The safest plan, in this case, is to temporize, until the pustule spontaneously bursts, promoting it by means of frequent fomentations, bathing the eye with warm milk and water, and applying emollient poultices. The spontaneous bursting of the little abscess is usually denoted by a sudden increase of all the symptoms of ophthalmy; particularly by an intolerable burning pain at the point of the cornea, where the abscess first began, greatly increased by motion of the eye, or eyelid. The event is confirmed by ocular inspection, and at the spot where the white pustule existed, a cavity appears, as may best be seen, when the eye is viewed in the profile. Extraneous bodies in the eye, which have simply divided a part of the cornea, or lodged in it, when soon extracted, do not in general cause ulceration, as the injured part heals by the first intention. Those which destroy, or burn the surface of this membrane, or which, when lodged, are not soon extracted, excite acute ophthalmy, suppuration at the injured part, and at length ulceration.

The ulcer of the cornea has this, in common with all solutions of continuity in the skin, where it is delicate, tense, and endowed with exquisite sensibility, that, at its first appearance, it is of a pale ash-colour; has its edges high, and irregular; creates sharp pain; discharges, instead of pus, an acrid serum, and tends to spread widely and deeply. Such is the precise character of ulcers upon the cornea, and such is that of those upon the nipples of the mammæ; the glans penis; lips; apex of the tongue; the tarsi; the entrance of the meatus auditorius externus; nostrils; &c. Ulcers of this description, neglected, or ill-treated, speedily enlarge, make their way deeply, and destroy the parts in which they are situated. If they spread superficially upon the cornea, the transparency of this membrane is destroyed; if they proceed deeply, and penetrate the anterior chamber of the aqueous humour, this fluid escapes, and a fistula of the cornea may ensue; and if it should form a larger opening in it, besides the exit of the aqueous humour, it occasions another more grievous malady than the ulcer itself, namely, a prolapsus of a portion of the iris; an escape of the crystalline lens and vitreous humour, in short, a total destruction of the whole organ of sight. This afflicting accident is not unfrequent, in consequence of acute ophthalmy from gonorrhea, when neither internal nor external means avail, to arrest the progress of ulceration. It is therefore of the highest importance, as soon as an ulcer appears upon the cornea, to impede its growing larger, as much as the nature of it will permit; the morbid process should be converted into a healing one, and the surgeon must exert his skill with more attention, the more extensive and deep the ulceration has proceeded. The cicatrix of a large ulcer impairs the texture of the cornea so much, that the injury is irreparable

They, who inculcate, that no external application can be adopted with benefit, for the cure of this disease, before the acute ophthalmy has been subdued, or, at least, diminished, are, in Scarpa's opinion, deceived. Experience teaches, that local remedies ought, in the very first instance, to be applied to the ulcer, such as are appropriate to lessen the increased morbid irritability, and stop the destructive process going on; afterwards such means should be taken, as will cure the ophthalmy, if it does not subside gradually, as the ulcer heals. It is a fact, confirmed by repeated observation, that it is the ulcer which keeps up the ophthalmy, not the ophthalmy the ulcer. The case, however, is to be excepted, in which the ulcer makes its appearance in the height of a severe ophthalmy. Here the first indication is to abate inflammation, before attempting to heal the sore.

On opening the little abscess of the cornea, it is true, the symptoms of acute ophthalmy become aggravated; the redness of the conjunctiva is increased, as well as the turgid state of its vessels; but it is equally certain, that it happens from no other cause, than an increased inflammation in

the part, in consequence of the augmented sensibility in the ulcerated spot of the cornea. As soon as this increase of sensibility in the ulcer of the cornea ceases, or abates, in violence, the ophthalmy retreats with equal speed, and, finally, when the ulcer heals, the inflammation vanishes gradually, or, at most, requires only the use of an astringent, and corroborant collyrium, for a few days. Analogous examples every day occur in practice, in ulcers of other parts, besides the cornea; particularly in little foul ulcers on the inside of the lips, on the apex of the tongue, on the nipples, on the glans penis, which, as was described above, at their first appearance, assume an ash-coloured surface, excite inflammation of the part in which they are seated, and cause a very troublesome itching and ardent heat in the part affected. To subdue this inflammation, we do nothing more, and the vulgar do the same, than repel the excessive irritability in these ulcers, and convert the ulcerative process into cicatrization. This done, the surrounding inflammation immediately disappears of itself.

The resource of art, productive of such speedy and such good effects, in these cases, is the caustic. It immediately destroys the naked extremities of the nerves in the ulcerated part, and soon removes that diseased irritability prevalent in the part affected; it converts the ash-coloured surface of the ulcer, and the serous discharge upon it, into an eschar and scab, which, as a kind of epidermis, moderates the contact of the neighbouring parts upon the ulcer, and, at length, converts the process of ulceration into that of granulation and cicatrization.

For cauterizing the ulcer of the cornea, the caustic to which Scarpa gives the preference, is the argentum nitratum. It must be scraped to a point, like a crayon pencil, and the eyelids being opened perfectly, and the upper eye-lid suspended, by means of Pellier's elevator, the ulcer of the cornea is to be touched with the apex sufficiently to form an eschar. Should any of the caustic dissolve in the tears, the eye must be copiously bathed with warm milk. At the instant the caustic is applied, the patient complains of a most acute pain; but this aggravation is amply compensated, by the ease experienced a few minutes after the operation: the burning heat in the eye ceases, as it were by a charm; the eye and eyelids become capable of motion without pain; the flux of tears and the turgidity of the vessels of the conjunctiva decrease; the patient can bear a moderate light, and enjoys repose. These advantages last while the eschar adheres to the cornea.

On the separation of the eschar sometimes at the end of two, three, or four days after the application of the caustic, the primary symptoms of the disease recur, especially the smarting and burning pain at the ulcerated part of the cornea; the effusion of tears; the restraint in moving the eye and eyelids; and the aversion to light; but all these inconveniences are less in degree than before. At their recurrence, the surgeon, without delay, must renew the application of the argentum nitratum, making a good eschar, as at first, upon the whole surface of the ulcer, which will, as before, be followed by perfect ease in the eye. The application of the caustic is, if required, to be repeated a third time, that is, if upon the separation of the eschar, the extreme irritability in the ulcer is not exhausted, and its progressive mischief checked. When the case goes on favourably, it is a constant phenomenon in the cure of this disease, that, at every separation of the eschar, the diseased sensibility of the eye is decreased, the ulcer also, abandoning its pale ash-colour, assumes a delicate fleshy tint, a certain sign that the destructive process which prevailed, is turned into a healing one. The turgid state of the vessels of the conjunctiva, and the degree of ophthalmy, disappears, in proportion as the ulcer draws near to a cure. At this epoch, when the formation of granulations has begun, the surgeon would act very wrongly, did he continue longer the use of the argentum nitratum; it would now reproduce pain, effusion of tears, and inflammation in the eye; and the ulcer would take on that foul ash-coloured aspect, with swelled and irregular edges, which it had in the beginning. Platner has noticed this fact. *Necesse est, ut hoc temperatâ manu, nec crebrius fiat, ne nova inflammatio, novaque lachryma hic acrioribus concitetur. Inst. Chirurg.* § 314. As soon as ease is felt in the eye, and granulations begin to rise, whether after the first, second, or third application of the caustic, the surgeon must refrain from the use of every strong caustic, and use no other application than the vitriolic collyrium. ℞ *Zinci Vitriol gr.* iv. *in Aq. Rosæ* ℥iv *cum* ℥ss *mucil. Sem. Cydon, mali M.* To be used every two hours, defending the eye, in the intervals, from the contact of the air and light, by means of a slight compress, and retentive bandage. In cases in which, besides the ulcer of the cornea, a slight relaxation of the conjunctiva remains, Janin's ointment, towards the end of the treatment, introduced between the eye and eyelids, morning and evening, proves extremely serviceable.

It must be qualified in strength and quantity to the particular sensibility of the patient.

To cure those superficial excoriations of the cornea, which make no incavation in the substance of this membrane, and which, in reality, are only a detachment of the cuticle, covering the layer of the conjunctiva continued over the cornea, the use of caustic is not requisite. The above vitriolic collyrium, combined with the mucilage, is sufficient. The symptoms which accompany such slight excoriations, or detachments of the cuticle, are unimportant, and when the patient takes care to bathe his eye, every two or three hours, with the solution of vitriol, and to avoid too much light, and the impression of the atmosphere, they soon get well.

Thus far of the ulcer of the cornea, and the best mode of curing it in ordinary cases. However, sometimes, in consequence of ill-treatment, the ulcer, already very extensive, assumes the form of a fungous excrescence upon the cornea, appearing to derive its nourishment from a band of blood-vessels of the conjunctiva; and, on this account, it occasions, not unfrequently, a serious mistake in being taken for a real pterygium. Left to itself, or treated with slight astringents, it produces, in general, a loss of the whole eye. It requires the speedy adoption of some active and efficacious plan, to destroy all the fungus upon the cornea, to annihilate the vessels of the conjunctiva tending to it, and to impede the progress of ulceration. This consists first in cutting away the fungus, with a pair of small scissars, to a level with the cornea, continuing the incision far enough upon the conjunctiva, to remove, with the excrescence, that string of blood-vessels, from which it seems to derive its supply. Having effected this, and allowed the blood to flow freely, it is proper to apply the argentum nitratum to all the space of the cornea, which appears to have been the seat of the fungus, so as to make a complete eschar; and if, upon its separation, the whole morbid surface should not be destroyed, the caustic must be repeated, until the ulcerative process changes into a healing one. To execute commodiously such a full application of the caustic, it is not in general enough to have the upper eye-lid raised by an assistant, and the lower one depressed; it is also further requisite, that the operator, by means of a spatula, introduced between the upper eye-lid and the eye-ball, should hold the same elevated with his own left hand, while, with the right, he applies the caustic, so as to form a strong deep eschar.

It must be acknowledged, the action of the caustic cannot always be calculated with precision, and therefore a portion of the whole thickness of the cornea may be destroyed with the fungus, which never fails to be followed by a prolapsus of part of the iris, through the aperture made in the cornea. This accident may seem to some very grievous; it is, however, not irreparable, as shall be shewn in the article *Iris, prolapsus of*; and when the surgeon can produce a firm cicatrix at the point, where the excrescence was situated, which resists a reproduction of the fungus, and a total destruction of the eye, he has fulfilled the indications required. (*Scarpa sulle Malattie degli Occhi.*)

OSSIFICATION OF THE CORNEA.

Mr. Wardrop has seen only one instance of ossification of the cornea; and, in that case, the whole eye was changed in its form, and the cornea had become opaque. On macerating the latter part, a piece of bone, weighing two grains, oval shaped, hard, and with a smooth surface, was found between its lamellæ. A piece of bone was also found between the choroid coat and retina of the same eye.

The same gentleman informs us, that Walter had, in his museum, a piece of cornea, taken from a man sixty years of age, and containing a bony mass, which was three lines long, two broad, and weighed two grains.

In Mr. Wardrop's publication, there is also recorded a curious case, in which a portion of bone was formed, either in the substance of the cornea, or immediately behind it, and which was extracted from the eye by Mr. Anderson, surgeon at Inverary. The patient was a woman thirty-one years of age, and the formation of the bony substance, which was about half as large as a sixpence, is said to have been occasioned by a fall against the root of a tree, fifteen years before the operation, by which accident the eye was struck, though not cut. (See *Wardrop's Essays on the Morbid Anatomy of the Human Eye, Chap.* 10.)

ALTERATION IN THE FORM OF THE CORNEA.

This is the last subject which I shall take notice of in the present article. It is well known, that the convexity of the cornea varies in different persons, and in the same individual at different periods of life, this part of the eye being naturally most convex in young subjects. It appears, also, from the experiments of the late Mr. Ramsden, and those of Mr. Home, that the sphericity of the cornea is altered according to the distance, at which objects are viewed.

Sometimes the cornea projects, or col-

lapses, so considerably, without its transparency being affected, that sight is much impaired, or quite destroyed. The first case has been called by some authors, the *Staphyloma pellucidum*; the second *Rhytidosis*.

Levéillé, the French translator of Scarpa's book on the diseases of the eye, has described a case, in which the cornea of both eyes became of a conical form. Mr. Wardrop has met with two examples of a similar disease; but only one eye was affected in each of them. In both cases, the conical figure of the cornea was very remarkable, and the apex of the cone was in the centre of the cornea. When the eye was viewed laterally, the apex resembled a piece of solid crystal, and when looked at directly opposite, it had a transparent sparkling appearance, which prevented the pupil and iris from being distinctly seen.

One of these cases occurred in a lady upwards of thirty years of age, and the changes, produced in her vision, were very remarkable. At the distance of an inch, or an inch and a half, she could plainly distinguish small objects, when held towards the temporal angle of the eye, although it required considerable exertion; but, the sphere of vision was very limited.

On looking through a small hole in a card, she could distinguish objects held very close to the eye, and could even read a book.

At any distance greater, than two inches, vision was very indistinct, and, at a few feet, she could neither judge of the distance, nor the form of the object.

When she looked at a distant luminous body, such as a candle, it was multiplied five or six times, and all the images were more or less indistinct. She could never find any glass sufficiently concave to assist her vision. She did not remark this complaint in her eye, until she was about sixteen years of age, and she does not think, it has undergone any change since that time.

In Mr. Wardrop's publication may be read a letter from Dr. Brewster, giving an explanation of the phenomena of the foregoing case.

It appears, that Mr. Phipps has had opportunities of watching the progress of several cases, in which the cornea had become conical, and that he never saw the disease in persons under the age of fourteen, or sixteen. The same gentleman also observes, that when the cone is once complete, the disease seldom makes any further progress, except that the apex sometimes becomes opaque.

Burgman saw a remarkable case, where the cornea of both the eyes of a person, who was hanged, were so prodigiously extended, that they reached down to the mouth, like two horns. (*Haller, Disputationes Chirurg. Tom.* 2.) The chapter by Mr. Wardrop on the preceding subject will be found highly interesting to such as are desirous of further information concerning this curious disease of the eye. (See *Wardrop's Essays on the Morbid Anatomy of the Eye, Chap.* 13.)

CORNS. (*Clavi, Spinæ Pedum, Calli, Condylomata*,&c.) A corn, technically called *clavus*, from its fancied resemblance to the head of a nail, is a brawn-like hardness of the skin, with a kind of root sometimes extending deeply into the subjacent cellular substance. When this is the case, the indurated part is fixed; but while the hardness is more superficial, it is quite moveable. Some corns rise up above the level of the skin, in the manner of a flat wart. They are hard, dry, and insensible, just like the thickened cuticle, which forms on the soles of the feet, or on the hands of labouring people.

Corns are entirely owing to repeated and long-continued pressure. Hence, they are most frequent in such situations as are most exposed to pressure, and where the skin is near bones, as on the toes, soles of the feet, &c. However, corns have occasionally been seen over the crista of the ilium, from the pressure of stays, and even on the ears, from the pressure of heavy ear-rings.

Corns of the feet are usually owing to wearing tight shoes, and, consequently, they are more common in the higher classes, and in women, than other subjects. In females, indeed, the ridiculous fashion of wearing high-heeled shoes, was very conducive to this affliction; for, certainly, it merits the appellation. In shoes thus made, the whole weight of the body falls principally on the toes, which become quite wedged, and dreadfully compressed in the end of the shoes.

Though some persons, who have corns, suffer very little, others occasionally endure such torture from them, that they are quite incapable of standing or walking. Doubtless the great pain proceeds from the irritation of the hard corn on the tender cutis beneath, which is frequently very much inflamed, in consequence of the pressure It is observed, that every thing which accelerates the motion of the blood, which heats the feet, which increases the pressure of the corn on the subjacent parts, or the determination of blood to the feet, or which promotes its accumulation in them, exasperates the pain. Hence, the bad effects of warm stockings, tight shoes, exercise, long standing, drinking, &c. The pain in warm weather is always much more annoying than in winter.

If a person merely seeks temporary relief, it may be obtained by pulling off his

tight shoes, sitting down, placing his feet in a horizontal posture, and becoming a little cool, the prominent portion of the corn should be cut off, as far as it can be done, without exciting pain, or bleeding, and the feet should be bathed in warm water.

The radical cure essentially requires the avoidance of all the above causes, and, particularly, of much walking, or standing. Wide, soft shoes, should be worn. Such means are not only requisite for a radical cure, but they alone very often effect it. How many women become spontaneously free from corns in child-bed, and other confinements? Though the radical cure is so easy, few obtain it, because their perseverance ceases as soon as they experience the wished-for relief.

When business, or other circumstances, prevent the patient from adopting this plan, and oblige him to walk or stand a good deal, still, it is possible to remove all pressure from the corn. For this purpose from 8 to 12 pieces of linen, smeared with an emollient ointment, and having an aperture cut in the middle, exactly adapted to the size of the corn, are to be laid over each other, and so applied to the foot, that the corn is to lie in the opening, in such a manner, that it cannot be touched by the shoe, or stocking. When the plaster has been applied some weeks, the corn commonly disappears, without any other means. Should the corn be in the sole of the foot, it it only necessary to put in the shoe a felt sole, wherein a hole has been cut, corresponding to the situation, size, and figure, of the induration.

A corn may also be certainly, permanently, and speedily eradicated, by the following method, especially when the plaster, and felt-sole with a hole in it, are employed at the same time. The corn is to be rubbed twice a day with an emollient ointment, such as that of marshmallows; or with the volatile liniment, which is still better; and in the interim, is to be covered with a softening plaster. Every morning and evening, the foot is to be put for half an hour in warm water, and, whilst there, the corn is to be well rubbed with soap. Afterwards, all the soft, white, pulpy outside of the corn, is to be scraped off with a blunt knife; but, the scraping is to be left off, the moment the patient begins to complain of pain from it. The same treatment is to be persisted in, without interruption, until the corn is totally extirpated, which is generally effected in eight or twelve days. If left off sooner, the corn grows again.

A multitude of other remedies for curing corns are recommended. They all possess, more or less, an emollient and discutient property. The principal are green wax, soap, mercurial, and hemlock plasters, a piece of green oil-skin, &c. They are to be applied to the corn, and renewed as often as necessary. An infallible composition consists of two ounces of gum ammoniacum, the same quantity of yellow wax, and six drams of verdigrease. In a fortnight, if the corn yet remain, a fresh plaster is to be applied.

It is frequently difficult, and hazardous to cut out a corn. The whole must be completely taken away, or else it grows again; and the more frequently it is partially cut away, the quicker is its growth rendered. When the skin is moveable, and, consequently, the corn not adherent to the subjacent parts, its excision may be performed with facility and safety, but, not without pain. But, in the opposite case, either leaving a piece of the corn behind, or wounding the parts beneath, can seldom be avoided. The latter circumstance may excite serious mischief.

A person, entirely cured of corns, is sure to be affected with them again, unless the above mentioned causes be carefully avoided. Some subjects are, indeed, more or less, disposed to have the complaint. There are persons, who for life wear tight shoes, and take no care of their feet, and, yet, are never incommoded with corns. On the contrary, others are constantly troubled with them, though they pay attention to themselves. Many are for a time vexed with corns, and then become quite free from them, though they continue to wear the same kind of shoes and stockings.

The above account is chiefly taken from *Richter's Anfangsgründe der Wundarzneykunst. Band* 1.

CORONOID PROCESS OF THE JAW; CORONOID PROCESS OF THE ULNA. For fractures of these parts, turn to *Fracture—Fractures of the Lower Jaw—Fractures of the Ulna.*

CORROBORANTS. Strengthening medicines, or applications.

CORTEX PERUVIANUS. (See *Cinchona.*)

COUCHING. The depression of the cataract, or the introducing of an instrument into the eye, for the purpose of pressing the opaque crystalline lens downward, out of the axis of sight. (See *Cataract.*)

COUVRE-CHEF. The name of some bandages. See *Bandage.*

COXARIUS MORBUS. The ischias, or disease of the hip. See *Joints.*

COXENDIX. (from *coxa*, the hip.) The ischium; the hip-joint. For an account of the disease of the hip-joint, see *Joints.*

CRANIUM. (quasi κρανιον, from κρα, the head.) The skull. For an account of its fractures, see *Head, Injuries of.*

CREMOR LITHARGYRI ACETATI.

℞ Cremoris lactis ℥j.
Aq. litharg. acet. ℥j. M.

Employed by Kirkland in ophthalmies, and other inflammations.

CREPITATION. This term is often applied to the crackling noise, made in cases of emphysema, when the air is passing from one part of the cellular membrane into another.

CREPITUS. (from *crepo*, to make a noise.) This term is applied by surgeons to the grating sensation, occasioned by the ends of a fracture, when they are moved, and rubbed against each other. A crepitus is one of the most positive symptoms of the existence of such an accident.

CRYPSOR'CHIS. A concealment of the testis within the abdominal ring.

CRYSTALLINE LENS. (from κρυσταλλος, crystal.) See *Cataract*.

CUPRUM VITRIOLATUM. (*Sulphate of Copper*) is an escharotic, and an ingredient in several astringent fluid applications, lotions for ulcers, collyria for the eyes, and injections for the urethra.

CURVATURE OF THE SPINE. See *Vertebræ, Disease of*.

CUTANEOUS NERVES OF THE ARM. The effects supposed to arise occasionally from these nerves being wounded in venesection, are spoken of in the article, *Bleeding*.

CYSTIDES. (from κυστις, a bag.) Encysted tumours. (see *Tumours, Encysted*.)

CYSTITIS. (from κυστις, the bladder.) Inflammation of the bladder.

CYSTITOME. (from κυστις, and τεμνω, to cut.) An instrument made on the same principle as the pharyngotomus, and intended to open the capsule of the crystalline lens. This name should more properly be applied to an instrument for cutting the bladder; but, *M. de la Faye*, who invented the cystitome, has rather ungrammatically chosen its name, and it will now probably continue for ever as it is. The sheath of the instrument conceals a little lancet, which is capable of darting out to the distance of one, two, or three lines, by means of a small spring, contained in the body of the instrument. In describing the modern plan of extracting the cataract, we have mentioned, that a gold needle is recommended by Baron Wenzel and Mr. Ware for puncturing the capsule of the crystalline lens. The cystitome is certainly not a bad instrument, and it might still be useful, in cases, in which the iris is very irritable, and disposed to contract in an unusual degree. It is now, however, never employed. (See *Encyclopédie Méthodique, Partie Chirurg.*)

CYSTOCELE. (from κυστις, the bladder, and κηλη, a tumour.) A hernia, formed by a protrusion of the bladder. (See *Hernia*.)

CYSTOTOMIA. (from κυστις, the bladder, and τεμνω, to cut.) Making an opening into the bladder, for the extraction of a stone or calculus. (See *Lithotomy*.)

CUPPING. (See *Bleeding*.)

CURETTE. (French.) A very small instrument, shaped like a spoon, or scoop, and used by operators, who extract the cataract, for taking away any opaque matter, which may remain behind the pupil, immediately after the crystalline has been taken out.

D.

DACRYOMA. (from δακρυω, to weep.) An impervious state of one, or both the puncta lachrymalia, causing an effusion of tears.

DARSIS. (from δερω, to excoriate.) An excoriation.

DAUCUS. The carrot is used in surgery for making a poultice, which is often applied to malignant and spreading ulcers. (See *Cataplasma Dauci*.)

DEASCIATIO. (from *de*, and *ascio*, to cut with a hatchet.) A kind of fracture, in which a piece of bone is, as it were, chipped off.

DECOCTUM CHAMŒMELI. ℞. Florum Chamæmeli ℥ss. Aquæ Distillatæ lbj. Boil ten minutes, and strain the liquor. This answers very well as a common fomentation. (See *Fomentum*.)

DECOCTUM DULCAMARÆ. ℞ Dulcamaræ Caulis Concisæ unciam, Aquæ Octarium cum Semisse. Decoque ad octarium, et cola.

The decoction of bittersweet is recommended for some cutaneous diseases, proceeding from scrofula, lepra, and lues venerea.

DECOCTUM HELLEBORI ALBI. (Now the *Decoctum Veratri*.) ℞ Pulveris Radicis Hellebori Albi ℥j. Aquæ Distillatæ lbij. Spiritus Vinosi Rectificati ℥ij. Boil the water and powder, till only half the fluid remains, and, when cold, add the spirit.

This is used as a lotion for curing t itch, tinea capitis, and some herpetic affections.

DECOCTUM LOBELIÆ. (*Blue Cat-*

dinal Flower of Virginia.) ℞ Radicis Lobeliæ Syphiliticæ Siccæ Manipj. Aquæ Distillatæ lb. xii. This is to be boiled till only four quarts remain. The lobelia gained repute as an antivenereal, though little reliance is now put in it. The patient is at first to take half a pint twice, and afterwards four times a day. It operates, however, as a purgative, and the doses must be regulated according as the bowels appear to bear them.

DECOCTUM MEZEREI. ℞ Corticis Radicis Mezerei Recentis ʒij. Radicis Glycirrhizæ Contusæ ʒj. Aquæ Distillatæ lbiij. Boil the mezereon in the water, till only two pints remain; and, when the boiling is nearly finished, add the liquorice root.

The decoction of mezereon has been much prescribed for venereal nodes and nocturnal pains, in doses of from four to eight ounces, three times a day.

DECOCTUM PAPAVERIS. ℞ Papaveris Somniferi Capsularum Concisarum ʒij. Aquæ lbiv. Boil for a quarter of an hour, and strain.

This decoction is used as a fomenting fluid in cases attended with great pain and inflammation.

DECOCTUM QUERCUS. ℞ Quercûs Corticis ʒj. Aquæ lbij. Boil down to a pint, and strain the fluid.

This decoction forms a very astringent injection, which is sometimes used for stopping gleets from the vagina. It also makes a lotion, which is of considerable use in cases of prolapsus ani. It may be applied to some slight rheumatic white swellings, which it will sometimes cure, particularly, when some alum is put into it.

DECOCTUM SARSAPARILLÆ. ℞ Sarsaparillæ Radicis Concisæ ʒiv. Aquæ Ferventis lbiv. The sarsaparilla is to be macerated for four hours, near the fire, in a vessel lightly closed. The root is then to be taken out, bruised, and put into the fluid again. The maceration is to be continued two hours longer, after which the liquor is to be boiled till only two pints remain. Lastly it is to be strained.

DECOCTUM SARSAPARILLÆ COMPOSITUM. ℞ Decocti Sarsaparillæ ferventis lbiv. Sassafras Radicis Concisæ, Guaiaci Ligni Rasi, Glycyrrhizæ Radicis Contusæ, Singulorum ʒj. Mezerei Radicis Corticis ʒiij.

These are to be boiled together for a quarter of an hour, and then strained.

This, and the preceding decoction of sarsaparilla, are much prescribed by surgeons in cases of venereal nodes and pains; but, while some surgeons hold these medecines in high repute, in such cases, others entertain an opposite opinion of them. It is common, also, to exhibit these decoctions in several cutaneous diseases, and in scrofula.

The simple decoction is frequently directed for the restoration of the constitution after a course of mercury, being often given mixed with an equal quantity of milk.

The common dose of both the decoctions is from four to eight ounces, three times a day.

The compound one possesses similar qualities to those of the famous Lisbon Diet Drink, and is now generally prescribed instead of it.

DECOCTUM ULMI. ℞ Ulmi Corticis Recentis Contus ʒiv. Aquæ lbiv. Boil to two pints, and then strain the liquor.

The decoction of elm bark is commonly prescribed in some herpetic diseases of the skin. Its operation is frequently promoted by giving with it the hydrargyri submurias.

DECOCTUM VERATRI. See *Decoctum Hellebori Albi.*

DECOLLATIO. (from *decollo*, to behead.) The having a part of the skull taken away with the scalp, in a wound of the head.

DECUSSORIUM. (from *decusso*, to divide.) An instrument to depress the dura mater after trepanning.

DEFENSIVE. An epithet given by surgical authors to such applications as defend parts.

DEFERENTIA VASA. In the article, *Hernia Humoralis*, the opinion of Mr. Hunter is related, that it is possible for the vas deferens sometimes to be rendered permanently impervious, in consequence of the inflammation of the testis being communicated to it.

In speaking of *Castration*, I have taken pains to reprobate the plan of including the vas deferens in the ligature, with which the spermatic cord is tied.

DEFLUXION. (from *defluo*, to flow down.) *Defluxio.* A falling down of humours from a superior to an inferior part. Many writers mean nothing more by it, than inflammation.

DELIGATIO. (from *deligo*, to bind up.) The application of bandages.

DENTISCA'LPIUM. An instrument for scraping the tartareous matter off the teeth. Oribasius denotes by this word an instrument for separating the gums from the teeth.

DENTITION. The process, by which the teeth make their way through the gums.

DENTODUCUM, or DENTIDUCUM. An instrument for drawing the teeth.

DEOBSTRUENTS. Medicines thought to have the power of removing obstructions. However, in the modern state of medicine, the doctrine of obstructions being the cause of many diseases is rejected as irrational and unfounded.

DEPASCENS ULCUS. A phagedenic ulcer.

DEPETIGO. (from *de*, and *pĕtigo*, a running scab.) A ring-worm, or tetter.

DEPRESSION. (from *deprimo*, to press down.) *Depressio.* This word in surgery means the sinking inwards of some part of the skull, in consequence of external violence. In this manner pressure is often made on the brain, and, hence, it frequently becomes necessary to raise the depressed portion of bone with an elevator, or to take it away altogether, with a trephine, or one of Mr. Hey's saws. (See *Head, Injuries of.*)

DEPRESSION OF THE CATARACT. The operation of couching, or removing the opaque crystalline lens out of the axis of vision, by pressing it downward into the vitreous humour with a particular kind of needle. (See *Cataract.*)

DEPRESSORIUM. (from *deprimo*, to press down.) An instrument for depressing the dura mater after trepanning.

DERIVATION. A term often met with in old medical and surgical books, and in some modern ones. It means the attraction of humours from one place to another, where they are discharged. Thus when a blister was put on the nape of the neck for the relief of a disease of the eye, the modus operandi was explained on the principle of derivation. In all the best schools, the old doctrine of derivation is now exploded. Counter-irritation is the principle, on which the moderns commonly explain what the old writers used to refer to *derivation.*

DESICCATIVES. Drying, or healing applications.

DESQUAMATIO. (from *desquamo*, to scale off.) The separation of scales of bone. Exfoliation.

DESQUAMATORIUM. (from *desquamo.*) An instrument for taking out a piece of the skull. A trephine, or trepan.

DETERGENT. Medicines fancied to have the quality of cleansing wounds. The conversion of a foul sore to one of clean appearance is effected by the action of the blood vessels and absorbents of the ulcerated surface, and, if any application deserve the appellation of a detergent, it is only because it excites this salutary action.

DETERMINATION. When the blood flows into one part more rapidly and copiously, than it does into others, or than is natural, it is said, in the language of surgery, that there is a *determination* of blood to such part.

DEUSTIO. (from *deuro*, to burn.) The scar of a scald, or burn.

DIÆRESIS. (from διαιρεω, to divide.) A division of substance; a solution of continuity. This was formerly a sort of generic term, applied to every part of surgery, by which the continuity of parts was divided.

DIAGNOSIS. (from διαγνωσκω, to distinguish.) The discrimination, or forming a judgment of a disease, from its symptoms.

DIAPHORE'TICS. Medecines, which promote perspiration.

DIAPLA'SIS. The reduction of a fracture, or dislocation.

DIAPYE'MA. An abscess.

DIA'RRHAGE. A fracture, particularly of the os temporis.

DIARRHŒ'A. A frequent purging.

DIATHESIS. Any particular disposition of the body.

DIGESTION. (from *digero*, to dissolve.) *Digestio.* By the *digestion* of a wound, or ulcer, the old surgeons meant bringing it into a state, in which it formed healthy pus.

DIGESTIVES. Applications, which promote this object.

DIGITIUM. (from *digitus*, a finger.) The contraction of a finger-joint. A sore on the finger: a whitlow.

DILATORIUM. (from *dilato*, to enlarge.) A surgical instrument for dilating any part.

DILUENTS. Medicines, which are supposed to increase the fluidity of the blood, and some of the secretions.

DIOPTRA. (from διοπτομαι, to see through.) An instrument, with which any cavity was dilated, and inspected.

DIORTHROSIS. (from διορθοω, to direct.) One of the ancient divisions of surgery: it signifies the restoration of parts to their proper situations.

DIPLO'PIA. (*Visus duplicatus.*) This is one of the most unusual diseases of the eyes, and it is of two kinds. For instance, the patient either sees an object double, treble, &c. only when he is looking at it with both his eyes, and, no sooner is one eye shut, than the object is seen single and right; or, else, he sees every object double, whether he surveys it with one, or both his eyes. The disorder is observed to affect persons in different degrees. Patients seldom see the two appearances, which objects present with equal distinctness; but, generally, discern one much more plainly and perfectly, than the other. The first distinct shape, which strikes the eye, is commonly that of the real object, while the second is indistinct, false, and visionary. Therefore, patients, labouring under this affection, seldom make a mistake, but, almost always know which is the true and real object. However there are cases, in which the patient sees the two appearances, which things assume, with equal clearness, so that he is incapable of distinguishing the real object from that, which is false and only imaginary.

The disorder is sometimes transitory and of short duration, and may be brought on in a healthy eye by some accidental cause, which is generally some irritation

affecting the organ. Sometimes, the complaint is continual; sometimes periodical. In some instances, the patient only sees objects double, when he has been straining his sight for a considerable time, as, for example, when he has been reading a small print for a long while by candle-light. In this case, the disorder becomes lessened by shutting the eyes for a few moments. There are also instances, in which the objects only have a double appearance at a particular distance, and not, either when they are nearer, or further off. Sometimes, the patient sees objects double only upon one side; as, for example, when he turns his eyes to the right hand, while nothing of this sort is experienced in looking in any other direction. In certain cases, objects appear double, let the eyes be turned and directed in any way whatsoever.

The causes of double vision may be divided into four classes. Namely, the object, which the patient looks at, may be represented double upon the retina, which is the effect of the first class of causes. Or, the object may be depicted in one eye differently from what it is in the other, in regard to size, position, distance, clearness, &c.; this is the effect of the second class of causes. Or, the object may appear to one eye to be in a different place from that which it seems to the other to occupy: the effect of the third class of causes. Or, lastly, the sensibility of the optic nerves is defective, so that the image of an object, though it may appear single to one eye as well as the other, yet, in one identical situation will seem double to both of them. When the complaint originates from causes of the first and fourth class, the patient sees things double, whether he is using only one, or both eyes; but, when it proceeds from the second and third class of causes, the patient only sees objects double, when he is looking at them with both eyes, and, no sooner does he shut one, than objects put on their natural, single appearance.

The following are the chief causes of the first class of a single object being depicted upon the retina as if double. 1. An unevenness of the cornea, which is divided into two, or more convex surfaces. There are cases, which shew, that such an uneven shape may actually be the cause of double vision. (*Haller, Element. Physiol. Tom. 5, p. 85.*) However, it must not be dissembled, that there is a far greater number of instances, in which such unevenness of the cornea, though equally considerable, does not occasion this defect of sight. We have principally an opportunity of observing cases of this sort after the operation of extracting the cataract. From these circumstances, it would seem, that the inequalities must be of a very particular shape to produce double vision. The diagnosis of this cause is easy enough; but, the removal of it is impracticable; for, how is it possible to restore the original shape of the cornea? 2. An inequality of the anterior surface of the crystalline lens, whereby the same is divided into several distinct surfaces, it is suggested, may also be the occasion of diplopia. Such an inequality may possibly produce the disorder; but, it is exceedingly doubtful, whether any case of this sort has ever been met with, and, as Richter properly remarks, the investigation is not worth undertaking, as the diagnosis and cure would be equally impracticable. The only possible method of cure would be the extraction, or depression, of the crystalline lens; yet, with the uncertainty respecting the nature of the cause, what man would be justified in performing an operation, in which the patient is not wholly exempt from the danger of losing his sight altogether? A double aperture in the iris, or as the case is termed, a double pupil, has been enumerated as a cause of diplopia. However, as Richter observes, the reality of such a cause is doubtful, for, cases have been noticed, where double vision was not the effect of there being two openings in the iris. (*Janin Mém. sur l'Oeil.*) But, were the disorder actually to originate in this way, it would not admit of a cure.

The causes of the second class, by the effect of which the object is represented, in regard to its size, position, distance, &c. differently in one eye from what it is in the other, are for the most part rather possible, than such as have been actually observed. The causes, which make objects assume an appearance contrary to the real one may sometimes be confined to one eye, to which things are depicted diversely from what they are to the other healthy eye, so that the patient sees, as it were, double. Thus, for example, there may be a stronger refraction of the rays of light in one eye, than the other; the patient may be a *myops* with one eye, and a *presbyops* with the other; and then the object will seem to one eye large, to the other small; to one eye distant, to the other plainly near. This state of the sight, indeed, is said to have occurred after operating upon a cataract in one eye. (*Heuermann.*) However, that this is not a common consequence of operating upon a cataract in one eye, while the other is perfect, seems to be clearly evinced by several cases in Wenzel's treatise on the cataract, by some facts, which are related both by St. Yves and Maitre-Jean, and by some observations, published in the Medical and Physical Journal, for May 1808. In consequence of a certain

defect of the sight, objects, which are perpendicular, seem to the patient to have a sloping posture. When it is considered, that only one eye is thus affected, and that to this things will appear sloping, and to the other healthy one straight, double vision must be the effect. A few remarks connected with this subject will be introduced hereafter. (See *Sight, Defects of.*)

When both eyes are so directed to an object, that it becomes situated in the axis of vision of each of these organs, such object is represented in both at the same place, that is, it is depicted upon that part of the retina, on which the axis of sight falls. Thus, the object seems to both eyes to be in the same place, and, though the two organs discern the thing, it only communicates a single appearance. But, when one eye is turned to any object in a different direction from that of the other; that is to say, when one eye is turned to an object in such a way, that the object is situated in the axis of vision of this eye, while the opposite eye is so turned, that the said object is placed on one side of its axis vision; in other words, when a person squints; the object is depicted in one eye upon a different part of the retina from what it is in the other; consequently, the object appears to the two respective organs to be differently situated, and the patient is affected with diplopia. This is the third species of this disorder, which arises from strabismus as a third kind of occasional cause. Such patients naturally only see objects double, when they behold them with both eyes.

A person, who squints, usually has one eye stronger than the other, and the weakness of one of these organs is the common cause of the strabismus. Such a person does not see objects double, because he only sees with one eye well, and with the other so faintly and imperfectly, that scarcely any impression is made. Hence, every case of strabismus is not necessarily combined with diplopia; indeed, the common kind of squinting is not joined with it. A person, affected with strabismus, only sees double, when the sight of each eye is equally strong, and when the squinting does not depend upon any weakness of one of the eyes, but, upon some other occasional causes. The principal causes of the latter sort are of a spasmodic nature: viz. an irritation affects some muscle of the eye in such a manner, that the patient is incapacitated from moving both his eyes according to his will, and from directing them to any object, so that such object may be at once in the axis of vision of both. Richter states, that, in the majority of cases, the irritation alluded to is seated in the gastric organs, though he thinks, that any other species of irritation may operate upon the eyes in a similar manner. This kind of diplopia is frequently attendant on other spasmodic diseases as a symptom. It often accompanies hypochondriasis. Sometimes, it is the consequence of violent pain. Richter informs us of a man, who saw double and squinted, during a severe headach. He states, that another was affected in the same way during a toothach. Sometimes, the diplopia is owing to a paralysis of one of the muscles of the eye; sometimes, to a tumour in the orbit. The diagnosis of this kind of diplopia is free from difficulty; the patient has been affected with squinting, ever since things have appeared double to him.

The fourth class of causes are such irritations as act upon the optic nerves, changing their sensibility in such a way, that objects do not make that sort of impression upon them, which they ought to do. Thus the patient sometimes sees things having the appearance of being coloured, when they are really not so; immoveable objects seem to him in motion; straight objects appear oblique, and in the cases, which we are now treating of, single things seem to the eye to be double, treble, &c. This faulty kind of sensibility may also be produced by irritation in eyes, which are perfectly sound; but, it is most readily occasioned in eyes, which are preternaturally weak and irritable. In these, very trivial and inconsiderable irritations will often excite it. In the treatment, the common indication is to discover and remove whatever irritation conduces to this effect; but, the attempt frequently fails. In very irritable eyes, the disorder is often brought on by very slight irritations, which cannot always be diminished, or removed. Here, the grand indication is to cure the weakness and irritability of the organs.

The fourth class of causes of diplopia are the principal and most frequent. The irritations giving rise to them, are of various kinds, and generally seated in the abdominal viscera. Diplopia is sometimes the consequence of inebriety, foulness of the stomach, intermitting fevers, hypochondriasis, worms, &c. However, the complaint is occasionally excited by other sorts of irritation. It has frequently followed a violent fright. It may be connected with spasmodic and painful diseases of several kinds. Severe headachs and toothachs are sometimes joined with this affection of the sight. Richter mentions a boy, who, being in the woods, was struck by the bough of a tree over the eye, and, in consequence of the accident, became affected with diplopia. He informs us of a man, who rode a journey

on horseback along a snowy road on a very sunshiny day, and was affected in the same manner. I cannot believe with this author, however, that stoppages of purgings and perspirations, and the driving inward of eruptions, have ever really been the cause of diplopia. This affection of the eyes is sometimes the effect of injuries of the head. Persons, who have weak eyes are apt to become double-sighted, whenever they attentively look for a long while at any light shining objects. Patients in fevers are also sometimes double-sighted.

The irritation, which is productive of diplopia, may lead to other serious complaints of the eye, when it operates with great violence. Indeed, it frequently happens, that diplopia terminates in some other disorder of the eyes, and it is often the forerunner of the worst diseases of these organs, particularly, the gutta serena. The difficulty, or ease of the cure partly depends upon the nature of the remote cause, and partly upon the condition of the eye. Some of the causes are easy, others difficult, of removal. When the eye is very weak and irritable, the disorder frequently continues, notwithstanding the irritation has been removed. Also, when the complaint is relieved, it is exceedingly difficult to prevent a relapse, for on very irritable eyes, slight irritations, which cannot be hindered, are apt to produce a return of the affection. Therefore, the indication is to remove the existing defect of sight, and take means for the prevention of its return, or the commencement of any other. The weakness and preternatural irritability of the eye should be removed, as well as every sort of irritation, things which are often very difficult of accomplishment.

The chief business of the surgeon, in the treatment of this kind of diplopia, consists in endeavouring to find out and remove the irritation occasioning the disorder. The majority of such irritations are of the same nature as those, which give rise to the gutta serena. (See *Amaurosis.*) Indeed, both the complaints are often only different effects of the same cause, and of course require a similar mode of treatment. The boy, whom Richter has mentioned, as having become double-sighted in consequence of being struck over the eye with the bough of a tree, was cured by the external use of the infusum radicis valerianæ and spiritus vini crocatus, with which the eyelids and adjacent parts were rubbed several times a day. A diplopia, which followed a violent fright, has been cured by valerian, preceded by a few doses of cream of tartar. An hypochondriacal patient got rid of the disorder by means of the warm bath. A diplopia, which was supposed to arise from some disorder of the bile, was cured by means of pills made of gum galbanum, guaiacum, rhubarb, and Venice soap, assisted with emetics and purgatives.

When the irritation, exciting the disorder, is only of temporary duration, as, for instance, looking at shining objects; when the disorder continues after the removal of the irritation; or, lastly, when the irritation cannot be well detected; the surgeon is to endeavour, by means of nervous and soothing medicines, either to remove the impression, which the irritation has left upon the nerves; or to render the nerves insensible to the continuing irritation. Experience is loudly in favour of the following remedies for cases of diplopia: hartshorn, dropped in the hand, and held before the eyes open; the external use of the spiritus vini crocatus; warm bathing of the eye, particularly, in a decoction of white poppy heads; bathing the eye in cold collyria; the internal administration of bark, valerian, small doses of ipecacuanha, flowers of zinc, and oleum cajeput. In one instance, in which it was impossible to detect the cause, Richter states, that soluble tartar with oxe's gall and castoreum was found of service; that, in another similar case, rhubarb, oxe's gall, and assa fœtida; and, in a third, aqua ammoniæ acetatæ with oxe's gall, proved useful. This author further observes, that, in all cases, in which the particular cause of the disorder cannot be precisely determined, we may always conjecture, that such cause has its seat in the abdominal viscera; and that much benefit may often be derived from mild resolvents, evacuants, and anodyne medicines. (*Richter's Anfangsgrunde der Wundarzneykunst. Band* 3. *Kap.* 15.)

DIRECTOR. (from *dirigo*, to direct.) One of the most common instruments of surgery; it is long, narrow, grooved, and made of silver, in order that it may be bent into any desirable shape. Its use is to direct the knife, and protect the parts underneath from the edge or point of the latter instrument. The surgeon introduces the director under the parts, which he means to divide, and then either cuts down, along the groove of the instrument, with a common bistoury, or cuts upward with a narrow, curved, pointed bistoury, the point of which is turned upwards, which he carefully introduces along the groove of the director. This instrument and the crooked bistoury are commonly employed for opening sinuses, for cutting fistulæ in ano, and other situations, and, for dilating the stricture in cases of hernia.

DIS'CRIMEN. A bandage formerly used after bleeding in the forehead. It is a narrow single-headed roller, which

is held with the left thumb apon a compress, letting about a foot of the bandage hang below the forehead. The roller is carried round the temples, and occiput in a circular manner. The part, which hangs down, is then to be carried over the head to the occiput, and fastened.

DISCUTIENTS. Applications, which tend to disperse swellings, and extravasated fluids by promoting the action of the absorbents.

DISLOCATION. (from *disloco*, to put out of place.) *A Luxation.* When the articular surfaces of the bones are forced out of their proper situation, the accident is termed, a *dislocation* or *luxation.*

The most important differences of luxations are, 1. with respect to the articulation, in which these accidents take place; 2. the extent of the dislocation; 3. the direction, in which the bone is displaced; 4. the length of time the displacement has continued; 5. the circumstances, which accompany it, and which make the injury simple, or compound; 6. and, lastly, with respect to the causes of the accident.

1. The loose joints, which admit of motion in every direction, are those, in which dislocations occur most frequently: such is that of the humerus with the scapula. On the contrary, the ginglymoid joints, which only allow motion in two directions, are, comparatively speaking, seldom dislocated. The articular surfaces of the latter are of great extent, and, consequently, the heads of the bones must be pushed a great way in order to be completely dislocated; and the ligaments are numerous and strong.

2. With respect to the extent of the dislocation, luxations are either *complete*, or *incomplete.* The latter term is applied, when the articular surfaces still remain partially in contact. Incomplete dislocations only occur in ginglymoid articulations, as those of the foot, knee, and elbow. In these the luxation is almost always incomplete; and very great violence must have operated, when such joints are completely dislocated. In the orbicular articulations, the luxations are almost invariably complete.

3. In the orbicular joints, the head of the bone may be dislocated at any point of their circumference; the luxations, are named accordingly *upward*, *downward*, *forward*, and *backward.* In the ginglymoid articulations, the bones may either be dislocated laterally, or forward, or backward.

4. The length of time, a dislocation has existed, makes a material difference. Recent dislocations may, in general, be easily reduced; but, when the heads of the bones have been out of their places, for several days, the reduction becomes exceedingly difficult, and, in older cases, very often impossible. The soft parts, and the bone itself, have acquired a certain position; the muscles have adapted themselves in length to the altered situation of the bone, to which they are attached, and, sometimes, cannot be lengthened sufficiently to allow the bone to be reduced. In many instances, in the course of a short time, the opening in the capsular ligament, becomes closed, so that the head of the bone cannot return into its original situation. Lastly, the luxated bone may become adherent to the parts on which it has been forced.

5. The difference is immense, in regard to the danger of the case, arising from the circumstance of a dislocation being attended, or unattended, with a wound, communicating, internally with the joint, and externally with the air. When there is no wound of this kind, the danger is generally trivial, and the dislocation is termed a *simple one:* when there is such a wound, together with the dislocation, the case is denominated *compound*, and is frequently accompanied with the most imminent peril. Indeed, the latter kind of accident often renders amputation proper.

6. The causes of dislocations are external and internal. A predisposition to such accidents may depend on circumstances natural, or accidental. The great latitude of motion, which the joint admits of; the little extent of the articular surfaces; the looseness and fewness of the ligaments; the lowness of one side of the articular cavity, as, at the anterior and inferior part of the acetabulum; and the shallowness of the cavity, as of that of the scapula; are natural predisposing causes to luxations.

A paralytic affection of the muscles, around the joint, and a looseness of its ligaments, are also predisposing causes. When the deltoid muscle has been paralytic, the mere weight of the arm has been known to cause such a lengthening of the capsular ligament of the shoulder-joint, that the head of the os brachii has descended two or three inches from the glenoid cavity.

The looseness of the ligaments sometimes makes the occurrence of dislocations so easy, that the slightest causes produce them. Some persons cannot yawn, or laugh, without running a risk of having their lower jaw luxated.

Such diseases, as destroy the cartilages, ligaments, and articular cavities, of the bones, may give rise to a dislocation. The knee is sometimes, but not frequently, partially luxated in consequence of a white-swelling; the thigh is often dislocated in consequence of the acetabulum and ligaments being destroyed by what

is commonly named the disease of the hip-joint. Such dislocations have been called *spontaneous*, as has been already observed.

An enarthrosis joint can only be dislocated by external violence, a blow, a fall, or the action of the muscles, when the axis of the bone is in a direction, more or less oblique, with respect to the surface, with which it is articulated.

Any external force may occasion a dislocation (generally incomplete) in the ginglymoid joints; but, in the ball and socket articulations, the action of the muscles is constantly concerned in producing such an accident. So, when a person falls on his elbow, while his arm is raised outwards from his side, the force, thus applied, will undoubtedly contribute very much to push the head of the os brachii out of the glenoid cavity, at the lower and internal part. Still, the sudden action of the pectoralis major, latissimus dorsi, and teres major, which always takes place from the alarm, will also aid in pulling downward and inward the head of the bone. The violent action of the muscles alone can, under certain circumstances, produce a dislocation, without the conjoint operation of any outward force.

Dislocations are constantly attended with more or less laceration of the ligaments: in such accidents of the shoulder and hip, the capsules are always torn.

SYMPTOMS OF DISLOCATIONS.

Pain, and inability of moving the limb, are only equivocal symptoms. In a dislocation of an orbicular joint, the limb must generally be either lengthened, as is the case, when the head of the thigh-bone is thrown downwards and inwards upon the obturator foramen; or else shortened, as is the case, when the same bone is luxated upwards and backwards.

The absence of such symptoms in luxations of the ginglymoid joints, however, is amply compensated by the superficial situation of the bones, which makes it easy to ascertain their relative situations.

The dislocations of the head of the bone, necessarily causes a change in the direction of the limb. So, when the os brachii is dislocated downwards and inwards, the arm, instead of hanging perpendicularly by the side, has its direction downwards and outwards. The bone being out of its natural situation, many muscles, inserted into it, necessarily become stretched, and others, relaxed. In dislocations of the humerus, the deltoid may always be observed to be tense and stretched.

The eminences of a dislocated joint become changed in relation to each other. Projections occur, where there should be depressions; and depressions, where there should be projections. So, when the arm is dislocated downwards and inwards, the head of the os brachii causes a hard tumour in the hollow of the axilla, while the part of the shoulder, just below the acromion, which is naturally prominent, now presents a vacancy.

In short, the chief diagnostic signs of a dislocated joint principally consist of circumstances, arising from the functions of the affected joint being interrupted, and from the lodgment of the articular extremity of the bone in an unnatural situation, among parts, which it compresses, and renders painful. Hence, there is a loss of motion in the joint; the limb, or part, is either shortened, lengthened, or distorted to one side, or another; the pressure of the dislocated head of the bone on the surrounding parts causes considerable pain, which is immensely increased, when the surgeon attempts to move the limb, in order to examine the case. The head of the dislocated bone may sometimes be distinctly felt, forming a preternatural tumour, or projection, while in the situation of the articular cavity, there is an unusual depression, or want of fulness.

A dislocation is termed *complete*, when the surfaces of the joint are not at all in contact; *incomplete*, when they partially touch each other; *simple*, when the accident is unattended with an external wound leading into the capsular ligament; *compound*, when such a wound also exists; *recent*, when the injury has only just occurred, or not existed long enough for any difficulty in the reduction to be occasioned by the proper treatment having been delayed; *ancient*, when the bones have been displaced a sufficient length of time for such difficulty to arise. Dislocations have also been divided into such as are *accidental*, (of which I shall particularly treat in the present article) and, into others, which are termed *spontaneous*, and arise from disease of the articulations. Of these last cases, notice will be taken under the head of *Joints, Diseases of*, especially in the section concerning the disease of the hip-joint, sometimes named ischias.

Dislocations are also, sometimes, attended with particular symptoms, arising altogether from the pressure caused by the head of the luxated bone on certain parts. The sternal end of the clavicle has been known to compress the trachea, and impede respiration: the head of the humerus may press upon the axillary plexus of nerves, and produce a paralytic affection of the whole arm.

As Kirkland has observed, there are some luxations, which are far worse inju-

ries than fractures: of this description are, dislocations of the vertebræ; cases, which are almost always fatal; dislocations of the long bones, with protrusion of their heads through the muscles and skin, and attended with severe inflammation, gangrene, tetanus, extensive abscesses, and subsequent caries; causes, which frequently exhaust the patient, and occasion death, as the practice of every man of experience must have convinced him.

PROGNOSIS.

Dislocations of enarthrosis joints are generally much less dangerous, than those of ginglymoid ones. The action of the muscles has a great share in producing the former; the violence done to the external parts is less; and the laceration of the soft parts is not so considerable. Even, in the same kind of joints, the seriousness of the case depends on the largeness of the articular surfaces, and the number and strength of the muscles and ligaments.

Dislocations of ginglymoid joints, however, are more easily reduced, than those of enarthrosis articulations, the muscles of which are frequently very powerful, and capable of making great resistance to the efforts of the surgeon. This is often exceedingly obvious in luxations of the shoulder, and thigh.

Dislocations from disease, termed *spontaneous*, cannot admit of reduction: when this accident happens in the hip-disease, it is not merely in consequence of the ligaments being destroyed, the brim of the acetabulum itself is often annihilated.

TREATMENT OF DISLOCATIONS IN GENERAL.

We shall first introduce the valuable remarks of Mr. Pott upon this part of the subject, and then add such others, as seem entitled to attention. Mr. Pott says, that the principle, concerning the extended or relaxed, that is, the resistant or non-resistant state of the muscles, as depending on the position of the limb, may be applied with equal truth and equal advantage to dislocations, as to fractures. Neither of them can indeed be rightly understood, or judiciously treated, without such consideration. In both, a perfect knowledge of the disposition, force, attachments and uses of the muscles, at least those of the limbs, are indispensably necessary.

Mr. Pott observes: By what our forefathers have said on the subject of luxations, and by the descriptions and figures which they have left us of the means they used, of what they call their organs and machinemata, it is plain that force was their object, and that whatever purposes were aimed at or executed by these instruments or machines, were aimed at and executed principally by violence.

Many, or most of them indeed, (says Mr. Pott) are much more calculated to pull a man's joints asunder, than to set them to rights. Hardly any of them are so contrived as to execute the purpose for which they should be used, in a manner most adapted to the nature or mechanism of the parts on which they are to operate. The force or power of some of the instruments is not always determinable, as to degree, by the operator, and consequently may do too little or too much, according to different circumstances in the case, or more or less caution or rashness in the surgeon.

Many of these instruments are now laid aside, and some few have been so altered, as to become useful; but before Mr. Pott, the same kind of principle, on which these instruments were originally founded and constructed, very generally prevailed, and violence was used, to the great fatigue, pain, and inconvenience of the patient in many cases, in which dexterity joined to a knowledge of the parts, would have executed the same purpose with facility and ease.

In dislocations, as in fractures, says Pott, our great attention ought to be paid to the muscles belonging to the part affected. These are the moving powers, and by these the joints, as well as other moveable parts, are put into action; while the parts to be moved are in right order and disposition, their actions will be regular and just, and generally determinable by the will of the agent, (at least in what are called voluntary motions;) but when the said parts are disturbed from that order and disposition, the action or power of the muscles does not therefore cease; far from it, they still continue to exert themselves occasionally; but instead of producing regular motions, at the will of the agent, they pull and distort the parts they are attached to, and which by being displaced cannot perform the functions for which they were designed.

"Hence principally, (says this author,) arise the trouble and difficulty which attend the reduction of luxated joints. The mere bones composing the articulations, or the mere connecting ligaments, would in general afford very little opposition; and the replacing the dislocation would require very little trouble or force, was it not for the resistance of the muscles and tendons attached to and connected with them: for by examining the fresh joints of the human body, we shall find that they not only are all moved by muscles and tendons, but also, that although

what are called the ligaments of the joints do really connect and hold them together, in such manner as could not well be executed without them, yet in many instances, they are, when stript of all connection, so very weak and lax, and so dilatable and distractile, that they do little more than connect the bones and retain the synovia; and that the strength, as well as the motion of the joints, depends in great measure on the muscles and tendons connected with and passing over them; and this in those articulations which are designed for the greatest quantity, as well as the celerity of motion. Hence it must follow, that as the figure, mobility, action, and strength of the principal joints, depend so much more on the muscles and tendons in connection with them, than on their mere ligaments; that the former are the parts which require our first and greatest regard, these being the parts which will necessarily oppose us in our attempts for reduction, and whose resistance must be either eluded or overcome; terms of very different import, and which every practitioner ought to be well apprised of."

Mr. Pott lays great stress on the necessity of examining the joints in the recent subject, not merely those of the skeleton, in order to understand the subject of dislocations.

The following are principles laid down by this author.

1. Although a joint may have been luxated by means of considerable violence, it does by no means follow, that the same degree of violence is necessary for its reduction.

2. When a joint has been luxated, at least one of the bones of which it is composed is detained in that unnatural situation by the action of some of the muscular parts in connection with it; which action, by the immobility of the joint, becomes as it were, tonic, and is not under the direction of the will of the patient.

3. That the mere bursal ligaments of some of the joints, endued with great mobility, are weak, distractile, and constantly moistened; that for these reasons they are capable of suffering considerable violence without being lacerated; but that they are also sometimes most certainly torn.

4. That, did the laceration of the said ligaments happen much more frequently than Mr. Pott believes it does, yet it cannot be a matter of very great consequence, as it neither totally prevents reduction, when timely and properly attempted, nor a consequent cure. The difficulty of reduction arising from this circumstance will be noticed again, when we speak of dislocations of the shoulder.

5. That supposing such accident to be frequent, yet as it is impossible to know, with any kind of certainty, whether it has happened or not, or in what part of the ligament, it cannot be admitted as a rule for our conduct, nor ought such mere conjecture to produce any deviation from what we ought to do, were there no such supposition. Could we know with certainty when and where this had happened, very useful information might indeed be drawn from it.

6. That all the force used in reducing a luxated bone, be it more or less, be it by hands, towels, ligatures or machines, ought always to be applied to the other extremity of the said bone, and as much as possible to that only. Some eminent surgeons have disputed this maxim, especially, in France.

In every joint capable of dislocation, the same circumstance, which renders it liable to be displaced, is also a very considerable assistance in its reduction. Mr. Pott means the dilatability or distractile power of the ligaments, or their capacity of giving way when stretched or pulled at.

This is perhaps the strongest argument which can be produced, why all the force made use of in reducing a dislocated joint should be applied to that bone only, and not to the next. By the yielding nature of the ligaments of the luxated joint, reduction is to be accomplished. The ligaments of the other articulation, which is not luxated, are yielding also; and all the force which is applied to the bone below or adjoining, must necessarily be lost in the articulation which is not luxated, and can be of little or no service in that which is. This remark, though made by Pott, and generally received as true, is very incorrect; for, it tends to state, that if you pull at the ankle, or wrist, the force does not operate on the hip, or shoulder.

"Let this principle (says Pott) be applied to the dislocation of the joint of the shoulder, and it will shew us why the ambi, in which the whole arm is tied down, and subjected to the extending power of the said instrument, is defective, and may be pernicious. Why instruments built on the same general principle, but in which the fore arm is not fastened down, but left at liberty and not subjected to the ligature, execute their purpose with a great deal less force. Why the vulgar but frequently very successful method of reducing this joint, by placing the operator's heel in the axilla of the supine patient, sometimes fails, the surgeon not having proper assistance, and contenting himself with pulling at the patient's wrist only. It will also shew us, why, in the case of a luxated os femoris at the joint of the hip, the strength of five or six people divided between the joint of the knee and that of

the ankle, shall be insufficient; and that of four, nay three of the same assistants, shall in the same case prove sufficient, by being all, and properly applied to the knee and femur only."

Mr. Pott's next principle is, 7. That in the reduction of such joints, as are composed of a round head, received into a socket, such as those of the shoulder and hip, the whole body should be kept as steady as possible, for the same reason as in the foregoing.

8. That in order to make use of an extending force with all possible advantage, and to excite thereby the least pain and inconvenience, it is necessary that all parts serving to the motion of the dislocated joint, or in any degree connected with it, be put into such a state as to give the smallest possible degree of resistance.

This, Mr. Pott considers as the first and great principle by which a surgeon ought to regulate his conduct in reducing luxations. This, says he, will shew us why a knowledge of all the muscular and tendinous parts, acting upon, or in connection with the articulations, is absolutely necessary for him who would do his business scientifically, with satisfaction to himself, or with ease to his patient. It will shew us, that the mere position of the limb below the luxated joint, is what must either relax or make tense the parts in connection with that joint, and consequently that posture is more than half of the business. It will shew us, why sometimes the luxated os humeri slips in, as it were, of its own accord, by merely changing the position of the arm, when very violent attempts, previous to this, have proved successless. It will shew us, why extending the arm in a straight line horizontally, or so as to make a right angle with the body, must in some instances render all moderate attempts fruitless. Why the method of attempting reduction by the heel in the axilla is so often successful, notwithstanding two very considerable disadvantages under which it labours, viz. part of the force being lost in the elbow, and the tense state of one head of the biceps cubiti. Why the tying down the fore-arm in the common ambi is wrong, for the same reasons. Why the fore-arm should at all times (let the method of reduction be what it may) be bent, viz. because of the resistance of the long head of the biceps in an extended posture. Why, when the os humeri is luxated forward, or so that its head lies under the great pectoral muscle, the carrying the extended arm backward, so as to put that muscle on the stretch, renders the reduction very difficult, and why, on the contrary, the bringing the arm forward, so as to relax the said muscle, removes that difficulty, and renders reduction easy. Why the reduction of a luxated elbow should always be attempted by bending the said joint. Why, when the inner ankle is dislocated in consequence of a fracture of the fibula, it is extremely difficult at all times, and sometimes impracticable, either to reduce or to keep reduced the said joint, while the leg is in an extended posture; and why a bent posture of the leg enables us with ease to accomplish both these ends. Why the case of dislocation of the head of the os femoris, (be it in what manner it may) a straight position of the leg and thigh will always increase the difficulty of reduction; and why that very distorted and bent position, in which the patient will always place it for his own ease, is and must be the posture most favourable for reduction; because it is and must be that posture in which the muscles, most likely to make opposition, are most relaxed and rendered least capable of resistance.

9. That in the reduction of such joints as consist of a round head, moving in an acetabulum or socket, no attempt ought to be made for replacing the said head, until it has by extension been brought forth from the place where it is, and nearly to a level with the said socket.

This will shew us, continues Mr. Pott, another fault in the common ambi, and why that kind of ambi, which Mr. Freke called his commander, is a much better instrument than any of them, or indeed than all; because it is a lever joined to an extensor; and that capable of being used with the arm, in such position as to require the least extension, and to admit the most; besides which it is graduated, and therefore perfectly under the dominion of the operator.

It will shew us, says Pott, why the old method by the door or ladder, sometimes produced a fracture of the neck of the scapula; as he has seen it do himself.

Why if a sufficient degree of extension be not made, the towel over the surgeon's shoulder, and under the patient's axilla, must prove an impediment rather than an assistance, by thrusting the head of the humerus under the neck of the scapula, instead of directing it into its socket.

Why the bar, or rolling-pin, under the axilla produces the same effect.

Why the common method of bending the arm (that is, the os humeri) downward, before sufficient extension has been made, prevents the very thing aimed at; by pushing the head of the bone under the scapula, which the continuation of the extension for a few seconds only would have carried into its proper place.

"I know it is said, observes Mr. Pott, that mere extension only draws the head of the bone out from the axilla, in which it was lodged, but does not replace it in

the acetabulum scapulæ. To which I will venture to answer, that when the head of the os humeri is drawn forth from the axilla, and brought to a level with the cup of the scapula, it must be a very great and very unnecessary addition of extending force, that will or can keep it from going into it. All that the surgeon has to do, is to bring it to such level: the muscles attached to the bone will do the rest for him, and that whether he will or not.

Indeed, continues this author, if all the rational means and methods for reducing a luxated shoulder be examined, they will be found to act upon this principle, however differently this matter may appear to those who have not attended to it. Even the common ambi succeeds by means of the extension, which the carrying the arm down with it produces, and not by its lever. That part of the instrument, so far from helping, is often a considerable hindrance, and even sometimes frustrates the operator's intention, by pushing the head of the bone against the scapula, before it is sufficiently drawn out from the axilla.

10. The last of Pott's principles is, that whatever kind or degree of force may be found necessary for the reduction of a luxated joint, that such force be employed gradually; that the lesser degree be always first tried, and that it be increased gradatim.

Whoever, says Pott, reflects on what is intended by extension, what the parts are which resist, and how that resistance may be best overcome, will want little argument to induce him to accede to this principle; the advantages deducible from attending to it, and the disadvantages which may and do follow the neglect of it, are so obvious.

They who have not made the experiment, will not believe to how great a degree a gradually increased extension may be carried without any injury to the parts extended; whereas great force, exerted hastily, is productive of very terrible and very lasting mischief.

Mr. Pott concludes with expressing his disapprobation of, what was termed, the *vis percussionis*. (See *Remarks on Fractures and Dislocations.*)

Dislocations in general require some trouble to be reduced; but they are easily kept so. Fractures, on the contrary, are generally easily reduced, but kept so with difficulty.

The extending force has been recommended to be applied by all the ancient writers to the luxated bone; for instance, to be applied above the knee in dislocations of the thigh-bone, and above the elbow in those of the humerus. We have stated, that Pott advised this plan, and the same practice is approved by J. L. Petit, Duverney, and Callisen, and adopted almost generally in our own country.

However, many of the best modern surgeons in France, for instance, Fabre, D'Apouy, Desault, Boyer, Richerand, and Levéillé, have advised the extending force not to be applied on the luxated bone, but, on that, with which it is articulated, and as far as possible from it. It is said, that this plan has two most important advantages: first, the muscles, which surround the dislocated bone, are not compressed, nor stimulated to spasmodic contractions, which would resist the reduction; secondly, the extending force is much more considerable, than in the other mode; for, by using a long lever, we obtain a greater degree of power.

In Pott's remarks, we find even him influenced by the prevailing prejudice against the above practice, that part of the extending force is lost on the joint, intervening between the dislocation, and the part, at which the extension is made. This notion is quite unfounded, as every man, who reflects, for one moment, must soon perceive. When extension is made at the wrist, the ligaments, muscles, &c. which connect the bones of the fore-arm with the os brachii, have the whole of the extending force operating on them, and they must obviously transmit the same degree of extension, which they receive, to the bone above, to which they are attached. This matter, indeed, seems so plain, that I think it would be an insult to the reader's understanding to say any more about it, than that such eminent surgeons, as have contrary sentiments, can never have taken the trouble to reflect for themselves on this particular subject. Whether the force necessary to be exerted in some instances, might not have a bad effect on the intervening joint, I cannot pretend to say; but, as Desault's practice was very extensive, and he did not find any objection of this kind, we have, perhaps, no right to conclude, that such a one would exist.

Extension may either be made by means of assistants, who are to take hold of napkins, or sheets, put round the part, at which it is judged proper to make the extension; or else a multiplied pulley may be used. In general, the first plan is preferred. Nothing more need be added to what Mr. Pott has stated, concerning the propriety of using moderate force in the first instance, and increasing the extending power very gradually.

The extension should always be first made in the same direction, into which the dislocated bone is thrown; but, in proportion as the muscles yield, the bone is to be gradually brought back into its natural position. Thus the head of the

bone becomes disengaged from the parts, among which it has been placed, and brought back to the cavity, which it has left, by making it describe the same course, which it took in escaping from it.

The extension will prove quite unavailing, unless the bone, with which the dislocated head is naturally articulated, be kept motionless by counter-extension, or a force at least equal to the other, but, made in a contrary direction.

The mode of fixing the scapula and pelvis, in luxations of the shoulder and thigh, will be described in speaking of dislocations of the arm and thigh.

In dislocations of ginglymoid joints, extension and counter-extension are only made, for the purpose of diminishing the friction of the surfaces of the joints, so as to be enabled to put them in their natural situation.

When the attempts at reduction fail, the want of success is sometimes owing to the extension not being powerful enough, and the great muscular strength of the patient, whose muscles counteract all the efforts to replace the bone.

In the latter case, the patient may be freely bled, and put into a warm bath, so as, if possible, to make him faint; hence the opening in the vein should be made large, because a sudden evacuation of blood is more likely to produce swooning, than a gradual discharge of it; and the patient, for the same reason, may be bled as he stands up. In very difficult cases, some authors have even recommended intoxication, which is certainly a very favourable opportunity for eluding the resistance, made to reducing dislocations, in very powerful subjects.

However, long continued, unremitting, not too violent, extension, will at last overcome the muscles of the most athletic man, and such practice is the most entitled to praise.

Dislocations of orbicular joints can seldom be reduced, after a month, though Desault used to succeed, with great violence, at the end of three or four. Dislocations of ginglymoid ones are, in general, irreducible after twenty, or twenty-four days, in consequence of anchylosis having taken place.

The reduction of a dislocation is known by the limb recovering its natural length, shape, and direction, and being able to perform certain motions, not possible while the bone was out of its place. The patient experiences a great and sudden diminution of pain; and, very often, the head of the bone makes a noise at the moment, when it returns into the cavity of the joint.

In order to keep the bone from slipping out of its place again, we have only to hinder the limb from moving. When splints can act powerfully in steadying the joint, they are, however, very often used, as in dislocations of the ankle, wrist, &c. As the humerus cannot be luxated, except when at some distance from the body, a return of its dislocation will be prevented by confining the arm in a sling, in such a way, that it cannot be raised from the side of the trunk. The spica bandage, applied after such an accident, is more satisfactory to the patient, than really efficacious. Whatever bandage is used to keep the arm from moving, should be put on the other end of the bone, as far as possible from the centre of motion.

COMPOUND DISLOCATIONS.

Compound Dislocations, as we have said, are those, which are attended with a wound communicating with the cavities of the injured joints. These accidents, like compound fractures, are frequently attended with great danger; and the same nicety of judgment is requisite in determining, whether amputation ought to be immediately performed, or an effort made to preserve the limb, as in cases of compound fractures. What we shall state on the latter subject, will, for the most part, be applicable to the present one.

The luxation of a large joint, being conjoined with an external wound, leading into the capsular ligament, is a circumstance, that has a particular tendency to increase the danger of the accident. In many cases, we see injuries of this description followed by violent and extensive inflammation, abscesses and mortification, fever, delirium, and death. When the patient is much advanced in years, is much debilitated, or of an unhealthy irritable constitution, compound luxations, especially, if attended with much contusion and other injury of the soft parts, and wrongly treated, very often have a fatal termination. This, however, is not the general event of compound dislocations, and whatever may have happened in former times, we now know, that, in the present improved state of surgery, these accidents mostly admit of cure. I would not, however, by any means insinuate censure against every instance of amputation performed in such cases. I know, that this operation is occasionally indispensible immediately after the accident, and I am equally aware, that it may become necessary in a future stage, when extensive abscesses, or sloughing, joined with threatening constitutional symptoms, have taken place. My only design is to recommend the endeavour to cure the generality of compound luxations. But, if a case were to present itself, attended with seri-

ous contusion and laceration of the soft parts, I should be as earnest an advocate for amputation as any surgeon whatsoever.

The treatment of a compound dislocation requires the reduction to be effected without delay, and with as little violence and disturbance as possible. The limb is then to be placed in splints, with the necessary pads, eighteen-tailed bandage, &c. The wound is to be freed from any dirt, clots of blood, or other extraneous matter, and its lips are to be accurately brought together with strips of adhesive plaster. The joint is to be covered with linen wet with the saturnine lotion; the bandage is to be loosely laid down, and the splints fastened on the limb with their proper straps, or pieces of tape, and the limb is to be kept perfectly at rest in an eligible posture. The patient, if strong and young, is to be bled. This last practice may be more freely adopted in the country, than in London, or large hospitals. Purging, however, must never be omitted, and an anodyne, the first night, or two, will be highly proper. Saline draughts, antimonials, and a low regimen, are also indicated during the first few days of the symptomatic fever, which commonly follows so serious an accident.

If the case takes a favourable course, the constitutional fever will not be excessive, nor will the pain and inflammation of the limb be immoderate. Sometimes, the wound unites, more or less, without suppuration; a circumstance most particularly to be desired, as tending more than any thing else to lessen the danger, by changing the case, as it were, from a compound into a simple one. In other cases, the wound is not united; but, the inflammation and suppuration are not violent, nor extensive; the constitution is not dangerously disturbed; and hopes of ultimate success may be reasonably entertained. When the wound is disposed to heal favourably, lint and adhesive plaster, or a pledget of soft soap cerate, are the best dressings. In other instances, while the suppuration is copious, and the parts are tense and painful, emollient poultices are the most eligible applications.

When the symptomatic fever, and first inflammatory symptoms, are over, and much discharge prevails, attended with marks of approaching weakness, the patient is to be allowed more food, and be directed to take bark, cordials, porter, wine, &c. If his nights are restless, he must have opiates; if he sweats profusely, sulphuric acid; and, in short, all such medicines, as his particular complaints may require, are to be prescribed.

When the inflammation of a compound dislocation is violent, or extensive, general bleeding, the application of leeches, and the use of fomentations, and poultices, are the most likely means of lessening the mischief. Yet, it is only in strong habits, that venesection to any extent can be prudently practised in large cities, or crowded hospitals.

In certain examples, the most skilful treatment is unavailing. The joint and limb become affected with considerable pain and swelling; the fever runs high; delirium comes on; and the patient may even perish from the violence of the first symptoms, the limb being generally at the same time attacked with gangrene. If these first dangers are avoided, the wound may yet not heal favourably; the inflammation may be considerable, or of an erysipelatous nature; large abscesses under the fasciæ may be formed; the bones may become carious; and the hectical symptoms, and sinking state of the patient, may make the only chance of recovery depend upon amputation. But, even this operation is sometimes deferred till too late, and the patient must be left to his miserable fate.

Whoever gives the smallest reflection to the nature of compound fractures, will perceive, that it is often a matter of the last importance, to make a right decision at the very beginning, whether amputation should be immediately done, or whether an attempt to save the limb ought to be made. In some instances, the patient's sole chance depends upon the operation being performed at once, without the least delay, and the opportunity of doing it never returns. The surgeon should take off the limb as soon as he has seen the nature of the injury, and not wait, till a general tendency to swelling and gangrene has spread through the member, and every action of the system is disturbed. Amputation, under these circumstances, hardly ever succeeds, and the patient too frequently dies, before the mortification has ceased to spread, and any opportunity of removing the limb presents itself.

But, besides this first critical period, the surgeon often has to exercise a nice degree of judgment in a future stage of the case; I mean, when the suppuration is copious, the wound open, the bones carious, and the health impaired. Here the practitioner may sometimes err, in taking off a limb, that might be saved; or, he may commit a worse fault, and make the patient lose his life, in a fruitless attempt to save the member. No precepts can form the right practitioner in this delicate part of surgery; genius alone cannot do it; the opportunity of making observations, and the talent of profiting by them, are here the things, which make the consummate surgeon.

It should ever be recollected in regard to bad compound dislocations, that in young subjects, and in a salubrious air,

many cases will do well, which in old persons, and in the polluted atmosphere of London, and crowded hospitals, would be fatal without amputation.

There is a practice, in regard to compound dislocations, which appears to me to deserve universal condemnation; I mean the plan of sawing off the head of the luxated bone. According to M. Levéillé, this method is recommended by Hippocrates as a means of accelerating and perfecting the cure. (*Noúvelle Doctrine Chirurgicale, Tom.* 2, *p.* 44). This extraordinary scheme, however, seems not to have done sufficient good, in ancient times, to obtain a lasting reputation. In fact, when it was mentioned by the late Mr. Gooch, it had sunk into such oblivion, that it was received as an entirely new proposal. "Compound luxations (says this author) are of a more dangerous nature, than compound fractures, for very plain reasons; but, if a surgeon should judge it advisable to attempt saving a limb under such threatening circumstances, *I am inclined to think, from what I have observed, he will be more likely to succeed, by sawing off the head of the bone, especially if it has long been quite out and exposed to the air.*"

Mr. Gooch afterwards takes notice of a case, in which Mr. Cooper, of Bungay, sawed off the heads of the tibia and fibula, and preserved the limb, the patient being able to walk and work for his bread for many years afterwards. Other examples are also briefly mentioned, in which the lower head of the radius was sawn off, and the head of the second bone of the thumb.

Mr. Hey, of Leeds, has been induced to make trial of this plan in a compound luxation of the ankle. The example, however, which he has published, is decidedly highly unfavourable to the practice, as the following passage will shew: "I was in hopes, that this patient would have been able to walk stoutly; but, in this, I was disappointed. He walked indeed without a crutch; but, his gait was slow, his leg remaining weak, and his toes turning outwards, which rather surprised me, as his leg, was very straight, when I ceased attending him."

Mr. Hey tells us, that he has not recited this case, with the view of recommending a similar practice in all cases of this accident; for, he has not always adopted it; nor, is he of opinion, that the same mode of treatment, whether by replacing the bones, sawing off their extremities, or amputating the limb, ought to be universally practised. When the laceration of the capsular ligament and integuments is not greater, than is sufficient to permit the head of the tibia to pass through them; and when, at the same time, the joint, or contiguous parts, have suffered no other injury; Mr. Hey recommends the replacing of the bone, and an union of the integuments by suture, with the treatment adapted to wounds of the joints. (*Practical Observations in Surgery, Chap.* 11, *Edit.* 2.)

I am sorry, that this respectable surgeon's name may hereafter be brought forward in justification of a method, which appears to have nothing to recommend it, either in reason, or experience. That in two or three cases, recorded by this gentleman and Mr. Gooch, the patients recovered, with a new sort of joint, only proves to my mind, the great resources and activity of nature, and her occasional triumph over the opposition she meets with from bad and injudicious surgery. A limb, so treated, must ever afterwards be shorter, than its fellow, and consequently the patient be more or less a cripple. We have seen, that in the only instance, published by Mr. Hey, considerable deformity was the consequence of the practice. I cannot help adding my belief, that Mr. Hey would experience more success in the treatment of compound dislocations, if he were to relinquish the objectionable method of sewing up the wound. In such accidents, every kind of irritation should be avoided as much as possible, and that the wound may be conveniently closed with sticking plaster, the observation, of numerous cases in St. Bartholomew's hospital, has perfectly convinced me. In this munificent institution, under the disadvantage of the air of London and an hospital, compound luxations are treated with marked success, and I feel warranted in ascribing the circumstance to the mode of treatment, which is conducted on the principles explained in this section of the Dictionary.

PARTICULAR DISLOCATIONS.

Dislocations of the Lower Jaw.

The lower jaw can only be luxated forward, and either one, or both of its condyles may become displaced in this direction. Every dislocation, except the one forward, is rendered impossible by the formation of the parts. The lower jaw cannot even be dislocated forward, unless the mouth, just before the occurrence of the accident, be very much open. Whenever the chin is considerably depressed, the condyles slide from behind forward, under the transverse root of the zygomatic processes. The cartilaginous cap, which envelops the condyles, and follows them in all their motions, still affords them an articular cavity; but, the depression of the bone continuing, the ligaments give way, the condyles glide before the *eminentiæ articulares*, and slip under the zygomatic arches. Hence,

a dislocation mostly happens, while the patient is laughing, gaping, &c. A blow on the jaw, when the mouth is wide open, may easily cause the accident. The case has occasionally arisen from the exercise of great force in drawing out the teeth. Whenever the jaw has once been dislocated, the same causes more easily reproduce the occurrence. In certain individuals, the ligaments are so loose, and the muscles so weak, that a dislocation is produced by any slight attempt to yawn, laugh, or (as Lamotte has observed) to bite any substance, which is rather large. (*Levéillé, Nouvelle Doctrine Chirurgicale, Tom.* 2, *p.* 54.) There have been persons, who could scarcely ever laugh heartily, without having their lower jaws luxated, in consequence of so doing. But, of all the causes of this occurrence, yawning alone, even without the combination of any external force, is by far the most common.

When the jaw is depressed, and its angles, to the external sides of which the masseters are attached, are carried upwards and backwards, if these muscles contract, the greater part of their force is employed to bring the condyles into the zygomatic depression. (*Boyer.*)

Dislocations of the lower jaw are attended with a great deal of pain, which Boyer imputes to the pressure produced by the condyles on the deep seated temporal nerves, and those going to the masseters, which nerves pass before the roots of the zygomatic process. The mouth is wide open, and cannot be shut. It is more open in recent dislocations, than in those, which have continued for some time. An empty space is felt before the ear, in the natural situation of the condyles. The coronoid process forms under the cheek-bone a prominence, which may be felt through the cheek, or from within the mouth. The cheeks and temples are flattened by the lengthening of the temporal, masseter, and buccinator muscles. The saliva flows in large quantities from the mouth, the secretion of which fluid is greatly increased by the irritation of the air. The arch, formed by the teeth of the lower jaw, is situated more forward, than that formed by the teeth of the upper jaw. The patient can neither speak nor swallow during the first days after the accident. (*Boyer.*) When only one condyle is dislocated, the mouth is distorted, and turned towards the opposite side, while the fellow teeth of the jaws do not correspond. Hey asserts, however, that the position of the chin is frequently not perceptibly altered. (*Practical Observations, p.* 322.)

The symptoms are not so well marked, when the accident has remained unreduced for several days, or weeks. In such instances, the chin becomes gradually approximated to the upper jaw; the patient recovers by degrees the faculty of speaking and swallowing; but, he stammers, and the saliva dribbles from his mouth. The sufferings induced by a dislocated jaw are certainly great enough to be sometimes fatal, if the case continue unrectified; but, we are not to believe Hippocrates, when he positively declares the accident mortal, if not reduced before the tenth day.

Monteggia attended a man, two months after such a luxation, which had not been understood, and Fabricius ab Aquapendente assures us, that he had never seen the prognostic of Hippocrates verified, though he had had many patients of this sort under his care. (*Levéillé, Nouvelle Doctrine Chirurgicale, Tom.* 2, *p.* 58.)

Dislocations of the lower jaw are to be reduced in the following manner: The surgeon is first to wrap some linen round his thumbs to keep them from being hurt by the patient's teeth, and then introduce them into the mouth, as far as possible on the grinding teeth. At the same time, he is to place his fingers under the chin and base of the jaw, and while he depresses the molares with his thumbs, he raises the chin with his fingers, by which means the condyles become disengaged from their situation under the zygomas; at which instant the muscles draw these parts so rapidly back into the articular cavities again, that the surgeon's thumbs would very probably be hurt, did he not immediately move them outward between the cheek and the jaw.

The reduction being accomplished, a recurrence of the accident is to be prevented by applying a four-tailed bandage, as recommended for the fractured jaw. The patient should for some time avoid eating food, which requires much mastication.

The ancients used to place two pieces of stick between the grinding teeth, and while they used these as levers to depress the back part of the bone, they raised the chin by means of a bandage. John de Vigo has described this method from Salicetus, Lanfranc, and Guido di Cauliaco; but, it is not preferable to the modern plan, in regard to efficacy; and it has the disadvantage of exposing the teeth to be broken by the sticks.

DISLOCATIONS OF THE VERTEBRÆ.

The large surfaces, with which these bones support each other; the number and thickness of their ligaments; the strength of their muscles; the little, which each vertebra naturally moves; and the vertical direction of their articular

processes; make dislocations of the dorsal and lumbar vertebræ quite impossible, unless there be also a fracture of the processes just mentioned. Of these cases I shall only remark, that they can only result from immense violence; that the symptoms would be an irregularity in the disposition of the spinous processes, retention or incontinence of the urine and feces, paralysis and a motionless state of the lower extremities, the effects of the pressure, or other injury, to which the spinal marrow is subjected. Similar symptoms may also arise, when the spinal marrow has merely undergone a very violent concussion, without any fracture or dislocation whatever; and, it is certain, that most of the cases mentioned by authors as dislocations of the lumbar and dorsal vertebræ, have only been concussions of the spinal marrow, or fractures of such bones.

The cervical vertebræ, however, not having such extensive articular surfaces, and having more motion, are occasionally luxated. The dislocation of the head from the first vertebra, and of the first vertebra from the second, particularly the last accident, is the most common; but luxations of the cervical vertebræ lower down, though very rare, are possible. (*Boyer.*)

DISLOCATION OF THE HEAD FROM THE FIRST VERTEBRA, OR ATLAS.

The os occipitis, and first cervical vertebra are so firmly connected by ligaments, that there is no instance of their being luxated from an external cause, and, were the accident to happen, it would immediately prove fatal by the unavoidable compression and injury of the spinal marrow.

An anchylosis, however, has been observed between the occiput and the atlas, attended with a change in their relative position and a lessening of the foramen magnum. A preparation of this kind is preserved in the Museum of Natural History at Paris. Levéillé conceives, that it must be this specimen, of which mention is made in the writings of Duverney and Bertin, and that the case originated from some chronic disease. (*Nouvelle Doctrine Chirurgicale, Tom.* 2, *p.* 60.)

DISLOCATIONS OF THE FIRST CERVICAL VERTEBRA FROM THE SECOND.

Every surgeon is aware, that the rotatory motion of the head is chiefly performed by the first vertebra moving on the second. When this motion is forced beyond its proper limits, the ligaments which tie the processus dentatus to the edges of the foramen magnum are torn, and, supposing the head to be forced from the left to the right, the left side of the body of the vertebra is carried before its corresponding articulating surface, while the right side falls behind its corresponding surface. Sometimes the processus dentatus, whose ligaments are ruptured, quits the foramen formed for it by the transverse ligament and the anterior arch of the first vertebra, and presses on the spinal marrow. In other instances, the processus dentatus does not leave its natural situation; but the diameter of the vertebral canal is always diminished at this place, and the spinal marrow consequently compressed, and otherwise injured. Patients can hardly be expected to survive mischief of this kind in so high a situation; indeed, they are frequently killed almost instantaneously.

According to surgical writers, the causes, which may produce this formidable accident, are various: a fall on the head from a high place; the fall of a heavy body against the back of the neck; a violent blow; a forcible twist of the neck; tumbling; standing upon the head; the rash custom of lifting up children by the head, &c. M. Louis found, that the first vertebra was dislocated from the second in the malefactors hanged at Lyons, at which place, the executioner used to give a sudden twist to the body, at the moment of its suspension.

Many dislocations of the cervical vertebræ do not prove fatal; but these occur at the third, fourth, fifth, or sixth of these bones, and only one articular process is luxated. In these instances, the vertebral canal is not so much lessened as to compress the spinal marrow, and occasion death.

If the luxation produce no symptom, which indicates a compression of the spinal marrow, it is prudent to abstain from all attempts to reduce it. When the symptoms are urgent and alarming, and some attempt to relieve the patient is the only chance he has of living, we are to begin by inclining the head to the side towards which it is directed, in order to disengage the articulating process of the upper vertebra: this part of the operation is extremely dangerous, as it may instantly produce death by increasing the pressure on the spinal marrow. When the process is disengaged, the head and neck are brought to their right direction, by making them perform a rotatory motion the contrary of that, which has taken place in the luxation. A relapse is to be prevented by keeping the head and neck perfectly motionless. (*Boyer.*)

There can be no doubt of the rationality of attempting an immediate reduction of the processus dentatus, if

signs of life should exist. This process is thrown back, so as to compress or injure the spinal marrow, while the atlas and the head itself are thrown forward. The recollection of these circumstances will enable a surgeon to do what is proper, better than any detailed directions.

A mother brought her child to Desault, with its neck bent, and its chin turned towards the right shoulder. The accident had been a consequence of the head having been fixed on the ground, while the feet were up in the air. A surgeon happened to be with Desault at the time, and they agreed to make an attempt to reduce the luxation, and to apprise the mother, that though the child might be cured, there was a possibility of its perishing under their hands. Being permitted to do what they judged proper, they fixed the shoulders, and the head was gently raised, and gradually turned into its natural position. The mother was rewarded for her courageous resignation; the child could now move freely; the pain ceased, and a considerable swelling in the situation of the luxation alone remained, and it was dispersed by the application of emollient poultices. (*Levéillé, Nouvelle Doctrine Chirurgicale, Tom.* 2, *p.* 62.)

Another alleged instance of the reduction of such a dislocation is also recorded by Dr. Settin in Schmucker's Vermischte Chirurgische Schriften. However, both in this case, and that related by Desault in his lectures, much doubt may be entertained, whether the accident were really such as it was supposed to be.

DISLOCATIONS OF THE CLAVICLE.

These are much less common, than fractures, which are said to occur six times more frequently.

The clavicle may be luxated at its sternal extremity, forwards, backwards, and upwards, but never downwards, on account of the situation of the cartilage of the first rib. The luxation forward is the most frequent, and almost the only one ever met with. It may arise from the other end of the clavicle being forced very much backward. Dislocations backwards and upwards are very unusual. To cause the first sort of accident, the shoulder must have been violently driven forwards, and at the same time depressed with great force. The dislocation backward, is more rare, than the one upward.

If the dislocation be forwards, a hard circumscribed tumour is felt, or even seen, on the front and upper part of the sternum. When the shoulder is carried forward and outward, this tumour disappears, and, previously, there is a vacancy where the head of the clavicle ought to be.

When the luxation is upwards, the distance between the sternal ends of the clavicles is diminished.

When the dislocation is backwards, there is a depression where the end of the clavicle ought to be, and the head of the bone forms a projection at the front and lower part of the neck, which, as J. L. Petit remarks, may compress the trachea, œsophagus, jugular vein, carotid artery, and nerves. The head is inclined towards the side, on which the accident itself is situated.

In reducing these dislocations of the sternal end of the clavicle, we are to make a lever of the arm, by means of which the shoulder is brought outwards; and when thus brought outwards, it is to be pushed forwards, if the dislocation is in that direction; backwards, if the dislocation be behind; and upwards, if the dislocation be above.

It is as difficult to keep the bone reduced, as it is easy to reduce it, so smooth and oblique are the articular surfaces.

The same position of the arm, and the same apparatus, as in fractures of the clavicle, are to be employed. The end of the clavicle, however, can never be kept from rising a little, and this would be the case even were the tourniquet used, which was proposed by Brasdor, for making pressure on the end of the bone.

The dislocation of the scapular end of the clavicle from the acromion is much less common. The luxation upwards is almost the only one that ever occurs. It is possible, however, for the accident to take place downwards, and for the end of the clavicle to glide under the acromion. The rarity of dislocations of the scapulary end of the clavicle, is owing to the strength of the ligaments tying the clavicle and acromion together.

A fall on the top of the shoulder may cause the dislocation upwards. The scapulary end of the clavicle then slides upwards on the acromion, and the shoulder is drawn inwards by the muscles which approximate the arm to the body.

The violent action of the trapezius muscle, in pulling upward the clavicle, may tend to produce the accident.

Pain at the top of the shoulder, and a projection of the end of the clavicle, under the skin covering the acromion, are symptoms indicating what has happened. The patient also inclines his head to the affected side, and avoids moving his arm or shoulder.

This dislocation is reduced by carrying the arm outwards, putting a cushion in

the axilla, and applying Desault's bandage for fractures of the clavicle, making such turns as ascend from the elbow to the shoulder, and press the luxated end of the bone downward, so as to keep it in its due situation. (See *Boyer's Leçons sur les Maladies Des Os.*)

Most surgeons, in this country, would be content with applying a compress, the figure of 8 bandage, and supporting the arm in a sling.

DISLOCATIONS OF THE OS BRACHII.

Nature, which varies according to the necessities of different animals, the number of their joints, has also been provident enough to vary the structure of these parts, according to the use of the different portions of their economy. To great moveableness some unite considerable solidity; for instance, the vertebral column. Others are very strong, but only admit of a slight yielding motion, as we observe in the carpus, tarsus, &c. Lastly, other joints admit of a great latitude of motion; but their strength is easily overpowered by the action of external bodies. Such are, in man, the shoulder-joint, and that between the sternum and clavicle.

The last kinds of articulation are particularly subject to dislocations, and, of all, not one is so often luxated as the shoulder-joint. Bichat mentions, that it appears, from a comparative table, that, in some years, this accident, at the Hotel-Dieu, has been as frequent, and even more so, than dislocations of all the other bones taken collectively.

Here every thing seems to facilitate the escape of the bone from its natural cavity. An oval shallow cavity, surrounded by a margin of little thickness, receives a half-spherical head, which is twice as broad as the cavity in the perpendicular direction, and three times as extensive from before backward. With respect to the ligaments, the joint is only strengthened by a mere capsule, which is thin below, where nothing opposes a dislocation; but thicker above, where the acromion, coracoid process, and triangular ligament, form an almost insurmountable obstacle to such an accident. With regard to the muscles, and motions of this joint, strong and numerous fasciculi surround the articular surfaces, make them easily move in all directions, and pushing the head of the os brachii against the different points of the capsule, distend this ligamentous bag, and, when their power exceeds the resistance, actually lacerate it. As for external bodies, what bone is more exposed than the os brachii, to the effect of their force?

Thus subjected to the influence of these predisposing causes, the os brachii would be in continual danger of being dislocated, if the scapula, which is as moveable as itself, did not furnish a point of support for it, by accompanying its motions. This point of support accommodates itself to the variations in the position of the head of the os brachii, so that to the moveableness of the articular surfaces, their strength is, in a great measure owing.

DIFFERENT KINDS OF DISLOCATION.

The shoulder-joint, very liable to luxations in a general sense, is not equally so at all points. There are some, where a dislocation cannot occur; there are others, where, though possible, such an accident has never been observed. Hence, before examining the mechanism of dislocations of this joint, it is essential to determine with precision the directions in which they may take place. Here, indeed, authors differ in a very singular manner. Sometimes, they have employed different terms to express the same thing; and, sometimes, they have employed the same words to signify different things. Invariably agreed about certain kinds of dislocations, they entertain opposite sentiments concerning others; and, in the midst of these differences, the perplexed surgeon often cannot decide on what basis to found his practice.

DIVISION ADOPTED BY AUTHORS.

The ancients, who knew very little of the natural relation of the parts surrounding the joint, were totally ignorant of the accidental relations, which such parts present in the case under consideration. Hence, no doubt, arose the confusion in their doctrines.

Many admitted four kinds of dislocations; many only three; some acknowledged only two; while others only allowed the possibility of one kind.

The first distinguished the different directions, in which the bone can be luxated. The dislocations were termed *upward*, *downward*, *forward*, and *backward*. Such was the opinion of the predecessors of Hippocrates, who, in informing us of it, demonstrates its inaccuracy. Others divided the dislocations of the shoulder into such as take place *downward*, *upward*, *outward*, and *forward*. This division is adopted by Galen, who, however, only cites an example of the luxation forward, and does not illustrate what he means by dislocations upward, and inward.

The second class of writers distinguished the species of dislocation, sometimes into those which occur *downward*,

forward, and *backward*. Oribasius was one of these. Sometimes, they named the luxations *downward*, *outward*, and *inward*. Paul of Ægina followed this plan, and, no doubt, his meaning is the same as that of Oribasius, only expressed in different terms. Sometimes, they called the dislocations *downward*, *forward*, and *upward*. Albucasis did so, and thought the latter case exceedingly uncommon.

The third set believed, that when the head of the os brachii was displaced, it could only be carried *downward into the armpit*, a very common case; and *forward*, which is less frequently seen. Celsus is almost the only one, who has established this difference: he remarks, *Humerus modò in aliam excidit, modo in partem priorem.*

Lastly, the fourth body of men only believed in the dislocation downward; which was the sentiment of Hippocrates, who had only seen this one sort of case in his practice. *At verò humerus inferiorem in partem excidit; aliam in partem excidere non audivi.*

The moderns borrowed from the ancients their divisions of dislocations of the shoulder-joint, and, at first, like their predecessors, they only determined in a vague manner the precise situations of these accidents. However, they afterwards fixed it with more determination, in proportion as they became enlightened by anatomy, and, in particular, took notice of the essential difference between primitive and consecutive luxations.

Petit admits four kinds of dislocations. 1. Downward on the inferior costa of the scapula, very rarely met with. 2. Outward, under the spine of this bone; a case, which as a primitive one, can only occur with difficulty. 3. Inward, into the armpit. 4. Forward, between the coracoid process and the clavicle. Heister, like this eminent practitioner, acknowledged four dislocations; but with a difference both of expression and meaning. One is downward, in the axilla; one forward, under the great pectoral muscle; another backward, under the scapula; and a fourth outward, under the spine of this bone. According to Duverney, primitive luxations never occur in any other direction than downward; the others being all the constant effect of muscular action.

DIVISION ADOPTED BY DESAULT.

In the midst of these very confused ways of viewing a very simple subject, it is, in the first place, necessary, in order to have determinate ideas, to divide dislocations of the humerus into *primitive* ones, which are the sudden effect of external violence, and into *consecutive ones*, which follow the first, by the influence of causes, which will be investigated.

Let the oval surface of the glenoid cavity be included within four lines; one representing its upper edge; another its lower; a third its inner edge; and a fourth its external one.

It is manifest, that the head of the humerus cannot be displaced towards the upper edge. There are situated the acromion and coracoid process, the triangular ligament stretched between them, the tendons of the triceps, supra-spinatus, and the fleshy portion of the deltoid, insurmountable obstacles to the luxation of the head of the bone, propelled by any force upward. Besides, what power could this be? Supposing there were such a force, the head of the bone must necessarily be driven outward as well as upward, ere its head would be displaced. This is impossible, because the trunk prevents the lower part of the arm from being directed sufficiently inward to produce this effect.

On the contrary, at the other margins, there is little resistance. At the inferior one, the long portion of the triceps; at the internal one, the tendon of the subscapularis; and at the external edge, those of the infra-spinatus, and teres minor; are capable of easily yielding to any power directed against them, and of allowing primitive luxations to take place, downward, inward, or outward. Downward, between the tendon of the long portion of the triceps, and the tendon of the subscapularis; inward, between the fossa subscapularis, and muscle of this name; outward, between the fossa infraspinata, and infraspinatus muscle.

After being pushed out of its cavity, and first placed in one of these three directions, the head of the humerus often changes its position; and then, to primitive luxations, downward, or inward, a consecutive one succeeds. But, the latter could never follow the primitive dislocation outward, were this to exist; as the spine of the scapula would form an obstacle.

A consecutive luxation inward may succeed a primitive one downward: indeed, nothing resists the head of the humerus, in the course which it then follows to get between the fossa subscapularis and the muscle similarly named. On the contrary, should it tend outward, it is opposed by the tendon of the triceps, and notwithstanding what Petit has written, there is never a consecutive dislocation in this direction.

It sometimes happens, that, after the head of the bone has escaped from the internal or inferior part of the capsule, it is carried behind the clavicle, and then

forms a consecutive dislocation upward; an event already noticed by Ambroise Paré, perhaps by Galen, and a specimen of which was preserved in Desault's cabinet. But, here, the secondary derangement only takes place slowly, and, when it occurs, it is almost always out of the power of art to rectify it, on account of the strong adhesions, contracted by the surfaces of the bone. Thus, in the instance to which allusion has been made, a new cavity was seen formed behind the clavicle, and the humerus adhered by new kinds of ligaments to the surrounding parts.

It follows, from what we have just been saying, that the humerus is subject to four kinds of dislocation. 1. Downward. 2 Outward. In these two directions the accident is always primitive. 3. Inward, which is sometimes primitive, sometimes consecutive. 4. Upward; a case which can never occur, except as a consecutive one.

The second and fourth cases are so very rare in comparison with the others, that these alone claim the practitioner's attention.

CAUSES, &c.

These vary according as the dislocation is primitive, or consecutive.

PRIMITIVE DISLOCATION.

The action of external bodies, directed against the arm; but, particularly, falls, in which this part is forced against a resisting body, gives rise to primitive dislocations, and then the different species of the accident are determined, by the particular position of the humerus at the instant, when the injury takes place.

Should this bone be raised from the side, without being carried either forward, or backward; should the elbow be elevated, and the fall take place on the side; then the weight of the trunk, almost entirely supported by this bone, forces downward its upper part, and this stretches and lacerates the lower part of the capsular ligament. Thus a luxation downward is produced, and its occurrence may also be facilitated by the combined action of the latissimus dorsi, pectoralis major, and teres major, muscles, as Fabre has judiciously remarked. Then, indeed, involuntarily contracted to support the trunk, these muscles act with the power of a kind of lever; in which operation the resistance is the head of the bone, which they draw downward, while the fixed point is the lower end of the bone, resting against the ground. Some authors also consider, as the immediate cause of a dislocation downward, the strong action of the deltoid, which then depresses the head of the bone, and pushes it downward out of the capsula. Certain observations seem incontestably to establish this mode of dislocation. Bichat mentions the well-known case of a notary, who luxated his arm downward, in lifting up a register.

The rationale of the primitive luxation inward differs very little from that of the preceding case. The elbow is both separated from the side, and carried backward: in falling, the weight of the body acts on the humerus, the front part of the capsule is lacerated, and a luxation takes place in this direction.

The dislocation outward is produced in the same sort of way. The elbow is carried forward, towards the opposite shoulder; the capsule is stretched outward, and if a sufficient force should act on the limb, is lacerated. But, how could such a force arise? In a fall, the arm pushed against the trunk, and kept there, could not move extensively enough to cause such a laceration. Hence, the luxation outward must necessarily be exceedingly rare. Indeed, there is no instance recorded of it in surgical books, and Desault in particular, never had occasion to observe such an accident. Besides, when, in a fall, the arm, raised from the side, is inclined forward or backward, the weight of the body only operates upon it obliquely, and the limb is very little exposed to the action of the latissimus dorsi, pectoralis major, and teres major muscles. No dislocation must occur more frequently, than that downward, in which the influence of both these causes is direct. The luxation inward, however, is very common, and a multitude of cases, which occurred to Desault confirm this kind of primitive dislocation, doubted by several modern authors, who are of opinion, with Hippocrates, that all dislocations at first take place downward.

The capsule may only be stretched in a primitive luxation, and then the articular surfaces only lose their relations imperfectly: but, most frequently, it is lacerated, and the head of the bone passes through the rupture. Authors have, in general, paid too little attention to this circumstance, which dissections have repeatedly demonstrated to practitioners, and to Desault in particular. This eminent surgeon had two specimens made of wax; one, of a dislocation inward; the other of one downward; both of which were met with in subjects, who died at the Hôtel Dieu. Bell also makes mention of similar facts, and another English surgeon, says Bichat, has observed the same occurrence. I suppose Bichat here

alludes to Mr. Thompson, who long ago noticed the laceration of the capsule, and particularly called the attention of surgeons to the subject, in the Medical Observations and Inquiries.

Here the same thing often happens, which is seen to occur in compound fractures, in which the ends of the broken part protrude through the skin. The capsule is sufficiently torn to let the head of the bone escape; but, the opening, afterwards being too narrow, forms a kind of constriction round the neck of the humerus, so as to prevent the return of the head of the bone into the place, which it originally occupied. Thus, in the fractures, of which we have just been speaking, the opening of the skin will not allow the end of the fracture to be reduced, without a previous dilatation of the wound.

In this state, should we endeavour to reduce the dislocation, the capsule being pushed against the glenoid cavity, becomes compressed between it and the head of the bone, which the surgeon now in vain attempts to reduce. Desault, was the first who noticed this practical fact, two examples of which are recorded in his journal, and cases of which have since very often presented themselves at the Hotel Dieu. In these cases, the head is commonly very moveable, because, being entirely on the outside of the capsule, nothing restrains its motions.

CONSECUTIVE DISLOCATION.

When a consecutive luxation follows a primitive one, several causes may concur in producing it. If a fresh fall should happen, while the arm is separated from the trunk, the head of the humerus, which nothing confines, obeys, with the utmost facility, the power displacing it in this manner, and is again pushed out of the situation, which it accidentally occupies.

A man, in going down stairs, meets with a fall, and dislocates the humerus downward; he immediately sends for Desault, who defers the reduction till the evening. In the mean time, the patient in getting upon a chair, slips and falls again. The pain was more acute, than when the first accident occured, and Desault, on his return, instead of finding the head of the humerus as it was in the morning, in the hollow of the axilla, finds it behind the pectoralis major muscle.

The action of muscles is a permanent cause of a new dislocation. When the humerus, indeed, is luxated downward, the pectoralis major, and the deltoid draw upward, and inward, the upper part of this bone, which, only making a weak resistance to their action, changes its position, and takes one in the above double direction.

The various motions imparted to the arm, may also produce the same effect, according to their direction. Thus a luxation inward has often been observed to follow one downward, in consequence of unskilful efforts to reduce the latter.

SYMPTOMS.

The diagnosis of dislocations of the humerus is, in general, attended with no difficulties.

Whatever may be the mode and situation of the dislocation, there always exists, as Hippocrates has remarked, a manifest depression under the acromion, which forms a more evident projection, than in the natural state. Almost all the motions of the arm are painful; some cannot be performed at all; and they are all very limited. The arm cannot move without the shoulder moving also, because the articulation being no longer able to execute its functions, both it and the shoulder form, as it were, one body.

To these symptoms, generally characteristic of every sort of dislocation of the humerus, are to be added such as are peculiar to each particular case. When the luxation is downward, the arm is a little longer, than in the natural state; it is capable of being moved a little outward; but, an acute pain is the inevitable consequence of moving it either forward, or backward. The elbow is more or less removed from the axis of the body, by the action of the deltoid, the long head of the biceps, and supraspinatus muscles, which, being stretched, contract and tend to draw the bone outward. The pains, which result from this position, compel the patient, in order to avoid them, to lean towards the side, on which the dislocation is, to keep the forearm half bent, and the elbow supported on his hip, in such a way, that the arm, having a resting place, may be sheltered from all painful motion, and stretching of the muscles. By this posture alone, Desault was in the habit of detecting a luxation downward, and his diagnosis was seldom found to be erroneous. Thus, in a fracture of the clavicle, the leaning posture of the patient is often, at the first glimpse, characteristic of the accident. In the axilla, there is constantly a more or less evident prominence, formed by the head of the humerus.

With the general symptoms of dislocations of the humerus, that inward has the following: the elbow, separated from the axis of the body, is inclined a little backward; the humerus seems to be directed towards the middle of the clavicle;

motion backward is not very painful, but that forward is infinitely so; there is a manifest prominence under the great pectoral muscle; the arm is very little longer than in the natural state; and the posture is the same, as in the foregoing case.

If there should be a dislocation outward, it would be particularly characterized by a hard tumour under the spine of the scapula; by the direction of the elbow forward; by its separation from the trunk; and by the somewhat increased length of the arm.

A projection behind the clavicle; a manifest shortening of the arm; and its direction; would clearly denote a dislocation upward.

The symptoms, distinguishing the nature of dislocations of the humerus, do not always present the same degree of certainty, as those announcing the existence of such an accident. Often nothing is more difficult, than to determine, whether the case is a primitive dislocation inward, or a consecutive one; the same phenomena being observable in both cases. An accurate history of the case, by representing the order in which such phenomena occurred, can alone throw light on this point, which is the more interesting, as in the two cases, the means of reduction should vary. In the first, the head of the bone returns, through a short track, into its natural cavity; in the second, it has to traverse a much greater distance to arrive there.

If, as Petit has pretended, there are dislocations backward, sometimes primitive, sometimes consecutive, this remark would be equally applicable to them.

Some analogous symptoms, between dislocations of the humerus, the fracture of its neck, and luxations of the scapular end of the clavicle, might here create some uncertainty, if, in the latter case, the absence of a tumour in the arm-pit, and of a depression under the acromion, did not prevent an error, which, Hippocrates says, may be easily made; into which, Galen states, the masters of the art fell; and which Paré cautions us to avoid. Uncertainty might arise, if in the fracture of the neck of the humerus, the proper symptoms of a fracture did not prevent a most detrimental mistake, which the occasional direction of the humerus, and a kind of prominence, formed by the lower end of the fracture in the axilla, might cause. (See *Fracture of the Neck of the Humerus.*)

Inflammatory symptoms seldom follow dislocations of the humerus. Many authors, particularly B. Bell, speak of an œdematous swelling of the whole upper extremity, as a very common consequence of a dislocation inward, and it is referred to the compression of the axillary glands. Experience has not often demonstrated this occurrence at the Hôtel Dieu, except in very old luxations; and when the thing has occurred, very beneficial effects have been obtained, in certain instances, by applying, for a few days, a moderately tight bandage from the fingers up to the axilla, after the reduction has been accomplished. Bichat relates a case, in which the œdema did not disappear with the cause, but even rather increased; but the day after a bandage had been applied, the swelling was found diminished by one half.

There is another consequence, to which authors have paid but little attention; but, it was known to Avicenna, and was several times observed by Desault. This is a palsy of the upper extremity, arising from the pressure, made by the head of the bone, dislocated inward, upon the axillary plexus of nerves. This consequence sometimes resists all the means of art, as Bichat proves by a case, which he relates.

The affection is very difficult of cure, when the nerves have been a long time compressed. Desault several times applied the moxa above the clavicle. The success, which he first experienced on some patients, did not follow invariably in others.

But, when the head of the humerus has only made, as it were, a momentary pressure on the nerves, and the reduction has been effected, soon after the appearance of the symptoms, the paralytic affection often goes off of itself, and its dispersion may always be powerfully promoted by the use of volatile linimenis.

OF THE REDUCTION.

We may refer to two general classes, the infinitely various number of means, proposed for the reduction of the dislocated humerus. The first are designed to push back, by some kind of mechanical force, the head of the bone, into the cavity from which it is displaced, either with, or without making previous extension. The others are merely intended to disengage the head of the bone from the place which it accidentally occupies, leaving it to be put in its natural situation by the action of the muscles.

By the first means, art effects every thing; by the second, it limits its interference to the suitable direction of the powers of nature. In the first method, the force externally applied always operates on the bone in the diagonal of two powers, which resist each other at a more or less acute angle; in the last, the power is only in one direction.

Here it is only necessary to state, that all the means, intended to operate in the

first way, act nearly in the following manner. Something, placed under the axilla, serves as a fulcrum, on which the arm is moved as a lever, the resistance being produced by the dislocated head of the humerus, while the power is applied either to the lower part of this bone, or the wrist. The condyles of the humerus being pushed downward and inward, the head of the bone is necessarily moved in the opposite direction, towards the glenoid cavity, into which it slips with more or less facility.

Thus operated the machine, so celebrated among the ancients and moderns, under the name of the ambi of Hippocrates; whether used in the form described by this father of medicine, or with the numerous corrections devised by Paul of Ægina, Ambroise Paré, Duverney, Freke, &c. By this machine, a double motion is communicated to the head of the humerus, as above explained.

The extension usually moves the bone from its unnatural situation, and is executed in different ways. Sometimes, the weight of the body on one side, and the dragging of the end of the dislocated bone on the other, tend to produce this effect. Such was the action of the ladder, door, &c. described in Hippocrates's Treatise on Fractures, and repeated in modern works. Sometimes, the trunk is fixed in an unchangeable manner, while the arm is powerfully extended, as is practised in employing the machine of Oribasius, and was one of the methods formerly adopted in the public places, where the wrestlers combated.

Sometimes, no extension is sensibly executed and while the end of the humerus is pushed outward by a body placed under the axilla, the surgeon pushes it upward into the glenoid cavity.

We shall not here inquire into the inconveniences peculiar to each of these methods. Petit and B. Bell have already done so. We shall only point out the objections, common to all of them.

The exit of the head of the bone, through the lacerated capsule is not necessarily attendant on the dislocation. Nor is it even possible to know with precision the situation of this opening. Why then should we make use of an artificial force to direct the head of the bone towards this opening?

However covered the body, placed under the axilla, may be, to serve as a fulcrum, there is always a more or less inconvenient chafing, frequently dreadful stretching and laceration of parts, in consequence of its application, when the trunk is suspended upon it, as in the instance of the door, &c. In this way, Petit has seen a fracture of the neck of the humerus produced, and even a laceration and aneurism of the axillary artery.

Few surgeons have ready at hand the different kinds of apparatus. Hence, trouble and loss of time in getting them; time, which is of so much moment in the reduction; this being always the more easy, the sooner it is accomplished.

When the luxation is consecutive, how can mechanical means bring back the head of the bone, through the track it has taken? For instance, if to a dislocation downward one inward has succeeded, the head of the bone must necessarily be brought down, before it can be replaced in its cavity. The above artificial means often act repugnantly to the action of the muscles, which is a chief and essential agent in the reduction.

If the dislocation should be upward, they would obviously be ineffectual.

Perhaps, however, they might be advantageously employed, when a primitive luxation downward is quite recent, and when the head of the bone is very near its cavity. Then the inferior costa of the scapula presents an inclined plane, along which the end of the bone can easily glide, when propelled by any kind of external force. No doubt, it is to this tendency of the head of the bone to be replaced, that we must attribute the success, certainly exaggerated, but in part real, on which the inventor of such machines endeavours to establish the superiority of his plan.

But, in this case, it is useless to multiply artificial powers, when natural means suffice, and when we can accomplish the reduction with the hands more effectually, because we can vary the motions with more precision.

Thus Desault very often employed the following method with great success. The patient being seated upon a chair of moderate height, he took hold of the hand on the affected side, placed it between his knees, which he moved downward and backward, in order to make the extension, and disengage the head of the bone, while an assistant held back the trunk to effect the counter-extension. This was sometimes executed by the weight of the body, and effort of the patient. At the same time, the surgeon's hands applied to the arm, in such a way, that the four fingers of each were put on the hollow of the axilla, and the thumbs on the outer part of the arm, pushed upward, and a little outward, the head of the humerus, which usually returned with ease into its natural cavity.

Petit explains this plan, though not as here described, but complicated with the use of a napkin, passed under the patient's axilla, and over the surgeon's neck, who contributes to raise the dislocated end of

the bone, by lifting up his head. This accessory method is always useless, and little methodical, preventing, also, such variation of the motions, as one may wish. The hands alone are always sufficient, and a multitude of instances attest the efficacy of this method, employed in Desault's way.

When the luxation downward has been very recent, Desault has, two, or three times, succeeded in reducing it, by a still more simple process. Marie-Louise Favert fell in going down stairs, dislocated her arm downward, and was conveyed, immediately after the accident, to the Hôtel-Dieu. Desault having recognized the disorder, placed his left hand under the axilla, to serve as a fulcrum, while with the right, applied to the lower and outer part of the arm, he depressed the humerus towards the trunk, and at the same time raised the upper part of the bone. The head of the humerus directed upward and outward by this double motion, returned into the glenoid cavity, without the least resistance. The arm was placed in a sling for two days, and, on the fourth, the patient resumed her wonted labour.

Dislocations downward are not the only ones, to which the first of the above simple plans is applicable. Primitive luxations inward sometimes yield to its adoption. Two examples of such success are to be found in the *Journal de Chirurgie*.

REDUCTION BY EXTENSION ALONE.

For the most part, however, such means are inadequate, and extension must be made. This employed alone, forms a second sort of means for reducing dislocations of the shoulder, and a few practitioners have deviated from the beaten path, and tried this latter plan. Celsus had recourse to nothing but extension in the ordinary cases of dislocation downward and forward. Albucasis was acquainted with no other mode. Douey, Douglas, and Heister, among the moderns, have absolutely rejected the use of machines, as always useless, and frequently dangerous. Lastly, Dapoui and Fabre examined with more exactness the process of extension, pointed out the manner of rendering it most advantageous in all cases, by the proper application of the extending force; and, in the dislocation of the humerus in particular, they obviated the inconvenience of pulleys, placed under the arm-pit on the affected side, shewing that the motion, vulgarly termed, coaptation, was of no utility. In these respects, the art is indebted to them for real improvement, and their doctrine, now universally diffused, was principally put into practice by Desault, who made it the base of his method of reducing all fractures, and dislocations in general.

To reduce a dislocation of the humerus, it is necessary to have a sufficient number of assistants, in order to increase the power according to the resistance which is to be overcome. But, two are usually sufficient for making the extension: in doing which, one should employ a linen pad, of sufficient thickness to project above the level of the pectoralis major, and latissimus dorsi. There must also be two bandages; one made of linen, several times doubled, four inches wide, and eight or nine feet long; the other being a towel, folded in the same way, and which is often unnecessary.

The patient is to sit on a chair of moderate height, or else he may lie down upon a table, which is firmly fixed, and covered with a mattress.

Desault, for a long while, used to put the patient in the first of these positions, which, though generally employed in practice, is not the best. In it the arm may be advantageously drawn in a transverse direction; but if, as is often the case, there be occasion to make extension upward or downward, the assistant is then obliged to rise up, and depress himself, has not sufficient power, finds himself obstructed, and cannot vary, at the pleasure of the surgeon, the direction in which the arm is to be extended. This position is also much more fatiguing to the patient, than one in which the trunk is equally supported upon a horizontal plane. Hence, Desault, in the latter years of his practice, abandoned the first position, and invariably adopted the last.

The patient being put in the proper position, the linen compress is to be put under the axilla, on the side affected, and upon this compress the middle of the first extending bandage is to be put, while its two heads ascending obliquely before and behind the chest, meet each other at the top of the sound shoulder, and are held there by an assistant, so as to fix the trunk, and make the counter-extension. The action of this bandage does not affect the margin of the pectoralis major and latissimus dorsi, in consequence of the pad projecting higher than them. If this were not attended to, these muscles being drawn upward, would pull in this direction the humerus, to which they are attached, and would thus destroy the effect of the extension, which is to be made in the following manner:—

Two assistants take hold of the forearm, above the wrist, or else the towel, doubled several times, is to be applied to this part. The two ends are to be twisted together, and held by one or two assist-

ants, who are to begin pulling in the same direction in which the humerus is thrown. After this first proceeding, which is designed to disengage the head of the bone from its accidental situation, another motion is to be employed, which differs according to the kind of luxation. If this should be downward, the arm is to be gradually brought near the trunk, at the same time that it is gently pushed upward. Thus, the head of the bone being separated from the trunk, and brought near the glenoid cavity, it usually glides into this situation with very little resistance.

When the luxation is inward, after the extension has been made in the direction of the humerus, the end of this bone should be inclined upward and forward, in order that its head may be guided backward; *vice versâ*, when the luxation is outward.

When the head of the bone has been disengaged by the first extension, the motion imparted to it by the rest of the extension, should in general be exactly contrary to the course which the head of the bone has taken, after quitting the glenoid cavity. When there is difficulty experienced in replacing the head of the bone, we should, after making the extension, move the bone about in various manners, according to the different direction of the dislocation, and the principle just noticed. This plan often accomplishes what extension alone cannot; and the head of the bone, brought by such movements towards its cavity, returns into it, while they are being executed.

When the dislocation is a consecutive one, it is the first extension, made in the direction of the displaced bone, which brings back its head to where it was primitively lodged, in order to act upon the bone afterwards, just as if the luxation were one of the primitive sort. Often it is only at the moment of the reduction, that it is possible to distinguish, whether a luxation is of one or the other kind. Indeed, as the reduction mostly takes place of itself, when the extension is properly made, if the head be situated consecutively inward, it is seen to descend along the internal part of the scapula, then to proceed to the lower part, and, lastly, to ascend towards the opening of the capsule, into which opening it returns.

When the extension is properly made, the reduction is almost spontaneously effected. Indeed, whatever may be the kind of primitive dislocation, it is clear, that the muscles on one side of the articulation must be put upon the stretch, while those on the other must be relaxed. Hence, a change must necessarily follow both in their directions and contractions, and also in the direction of these contractions. From this change the muscles, when they act, instead of drawing back the head of the bone towards the ruptured capsule, pull it in another direction, and thus produce a consecutive dislocation.

But, if by rectifying things, the extension should chance to restore to the muscles their former direction, then obeying their natural irritability, increased by the stretching of the extending power, they will bring back the head of the bone to the opening in the capsule, and oblige it to enter with much more certainty, than the efforts of the surgeon could do, who is always ignorant of the precise situation of this opening. On the contrary, if the extension, in consequence of not having been properly made, should not have restored to the muscles their natural direction, then the head of the bone will be drawn to some other point of the capsule, away from that which has been lacerated: and hence arise the very frequent difficulties attendant on the reduction of dislocated shoulders.

It follows from what has been said:—1. That all the art of treating dislocations, consists in giving a proper direction to the extending force. 2. That in general the coaptation is useless. 3. That reducing a dislocation does not consist in putting back the head of the bone into its cavity; but, in putting the muscles in a proper state for accomplishing this reduction, and that here, as every where else, art is only the handmaid of nature.

There are cases, however, in which the action of the muscles, being perverted by the oldness of the dislocation, and by the adhesions contracted with the surrounding parts, it becomes necessary to employ such means, as will serve to force, as it were, the head of the bone into its cavity, whither the muscles cannot bring it.

With reasoning is combined experience, which is always the most effectual proof of this doctrine, both respecting reductions of the dislocated humerus, and of such accidents in general. Desault only employed extension, variously diversified, till he had put the muscles in a state, favourable for accomplishing reduction. The most prompt success constantly crowned this part of his practice, and, doubtless, much of this success must be imputed to his wisely refusing to interfere in too great a degree.

When the reduction has been accomplished, if the arm should be very moveable, and seem to have a tendency to be dislocated again, it must be fixed, for a few days, in such a way as will prevent all motion.

A sling, well applied, suffices for this purpose; and, indeed, the arm should always be kept quietly supported in one,

after a dislocation. The French apply the bandage, which Desault has recommended for the fractured clavicle.

OF SOME CIRCUMSTANCES, RENDERING THE REDUCTION MORE DIFFICULT.

1. *Narrowness of the opening of the Capsule.*

The opening of the capsule, being too narrow to allow the head of the bone to return into the glenoid cavity, is one of the chief impediments to reduction. The obvious indication is to enlarge such an opening, by lacerating its edges. This is fulfilled by moving the bone about freely, in every direction, particularly in that in which the dislocation has taken place. Now, by pushing the head of the bone against the capsule already torn, the latter becomes lacerated still more, in consequence of being pressed between two hard bodies. The reduction, which is frequently impracticable before this proceeding, often spontaneously follows, immediately after it has been adopted. In the *Journal de Chirurgie* are two cases, by Anthaume, and Faucheron, establishing this doctrine.

Mr. White, of Manchester, believed, that the reduction was sometimes prevented by the head of the bone not being able to get through the laceration in the capsule again. He succeeded in reducing some such cases in the following manner: having screwed an iron ring into a beam at the top of the patient's room, he fixed one end of the pulleys to it, and fastened the other to the dislocated arm by ligatures about the wrist, placing the arm in an erect position. In this way, he drew up the patient, till his whole body was suspended; but, that too much force might not be sustained by the wrist, Mr. White at the same time directed two other persons to support the arm above the elbow. He now used to try with his hands to conduct the arm into its place, if the reduction had not already happened, as was sometimes the case. Occasionally, a snap would be heard, as soon as the patient was drawn up; but, the reduction could not be completed, till he was let down again, and a trial made with the heel in the arm-pit. When no iron ring was at hand to suspend the patient from, Mr. White used to have the patient raised from the ground by three or four men, who stood upon a table. (*Cases in Surgery, by Charles White, F.R.S. p.* 95.)

2. *Oldness of the Dislocation.*

This is a second impediment to reduction, still more difficult to surmount than the foregoing one. The head of the bone, which has lodged a long while in its accidental situation, contracts adhesions to it. The surrounding cellular substance becomes condensed, and forms, as it were, a new capsule, which resists reduction, and which, when such reduction cannot be accomplished, supplies, in a certain degree, the office of the original joint, by the motion which it allows.

The majority of writers, and Bell in particular, advise, in this case, that no attempt at reduction should be made, as it would be useless in regard to the dislocation, and might be injurious to the patient, from the excessive stretching of parts. This was for some time the doctrine of Desault; but, in his latter years, experience led him to adopt a bolder practice.

Complete success, obtained in dislocations, which had existed from fifteen to twenty days, encouraged him to attempt reduction at the end of thirty, and thirty-five days, and, in the two years preceding his death, he succeeded, three or four times in reducing dislocations which had existed two months and a half, and even three months, both when the head of the bone was situated at the lower, and at the internal part of the scapula.

However violent or protracted the extension may have been, none of the terrible consequences with which, authors threaten us, ever occurred. One phenomenon, which it was difficult to foresee, and of which we shall speak presently only took place in two instances.

In these cases it is necessary, before making the extension, to move the bone about extensively in all directions, for the purpose of first breaking its adhesions, lacerating the condensed cellular substance, serving as an accidental capsule, and of producing, as it were, a second dislocation, in order to remove the first. Extension is then to be made in the ordinary way, but with an additional number of assistants.

The first attempts frequently fail, and the dislocated head of the bone continues unmoved, notwithstanding the most violent efforts. In this case, after leaving off the extension, the arm is to be again moved about most extensively. The humerus is to be carried upward, downward, forward, and backward. Force the resistances. Let the arm describe a large segment of a circle, in the place where it is situated. Let it be once more rotated on its axis; then let the extension be repeated, and directed in every way. Thus, the head of the bone will be first disengaged by the free motion, and will afterwards be reduced.

In these cases, when the dislocation, in consequence of being very old, presents great obstacles in the way of reduction,

even though the attempts made for this purpose should fail, they are not entirely useless. By forcing the head of the bone to approach the glenoid cavity, and even placing it before the cavity, and making it form new adhesions, after the destruction of the old ones, the motions of the arm are rendered freer. Indeed, they are always the less obstructed, the nearer the head of the bone is to its natural situation.

3. *Contractions of the Muscles.*

A third impediment to the reduction of every kind of dislocation, is the power of the muscles, which is augmented beyond the natural degree, in consequence of their being on the stretch. Sometimes, this power is so considerable, that it renders the head of the bone immoveable, though the most violent efforts are made. Here the means to be adopted are such as weaken the patient, bleeding, the warm bath, &c. Extension unremittingly, but not violently, continued for a length of time, will ultimately fatigue the resisting muscles, and overcome them with more safety and efficacy, than could be accomplished by any sudden exertion of force.

The swelling about the joint, brought on by the accident, usually disappears without trouble.

Another consequence, which seldom occurs in practice, concerning which, authors have scarcely said any thing, and which Desault several times had occasion to observe, is a considerable emphysema, suddenly originating at the time of reduction. In the middle of such violent extension, as the long standing of the dislocation requires, a tumour suddenly makes its appearance under the great pectoral muscle. Rapidly increasing, it spreads towards the arm-pit, the whole extent of which it soon occupies. It spreads backward, and, in a few minutes, sometimes becomes as large as a child's head. A practitioner, unacquainted with this accident, might take it for an aneurism, occasioned by the sudden rupture of the axillary artery, from the violent extension. But, if attention be paid to the elasticity of the tumour, to its fluctuation, to the situation where it first appears, commonly under the great pectoral muscle, and not in the axilla; to the continuance of the pulse; and to the unchanged colour of the skin; the event may easily be discriminated from any rupture of the artery. (*Œuvres Chirurg. de Desault, par Bichat, Tom.* 1.)

The saturnine lotion, and gentle compression with a bandage, are the most advantageous means for dispersing the above kind of swelling.

I shall conclude the subject of luxations of the shoulder with the following singular observation recorded by M. Larrey.

"Among the curious anatomical preparations, (says he) which I saw in the cabinet of the University of Vienna, there was a dissected thorax, shewn to me by Professor Prokaska, in which the whole orbicular mass of the head of the right humerus, engaged between the second and third true ribs, projected into the cavity of the chest. This singular displacement was the result of an accidental luxation occasioned by a fall on the elbow, while the arm was extended and lifted from the side. The head of the humerus, after tearing the capsular ligament, had been violently driven into the hollow of the axilla, under the pectoral muscles, so as to separate the two corresponding ribs, and pass between them. The diameter of the head of the bone surmounted this obstacle, and penetrated entirely into the cavity of the thorax, pushing before it the adjacent portion of the pleura. Every possible effort was made in vain to reduce this extraordinary dislocation. The urgent symptoms, which arose, were dissipated by bleeding, warm bathing, and antiphlogistic remedies. The arm, however, remained at a distance from the side, to which condition, the patient became gradually habituated, and, after several years of suffering and oppression, he at length experienced no inconvenience. The patient was about sixteen or seventeen, when he met with the accident; and he lived to the age of thirty-one, when he died of some disease, which had no concern with the dislocation. His physicians were anxious to ascertain the nature of this curious case, of which they had been able to form only an imperfect judgment. They were much surprised to find, upon opening the body, the head of the humerus lodged in the chest, surrounded by the pleura, and its neck closely embraced by the two ribs above specified. They were still more astonished to find, instead of a hard spherical body covered with cartilage, only a very soft membranous ball, which yielded to the slightest pressure of the finger. The cartilage and osseous texture of the whole portion of the humerus, contained within the cavity of the chest, had entirely disappeared. *Les absorbans s'en étaient emparés,* (says M. Larrey) *et comme autant de gardiens fidèles, ils avaient cherché à détruire par portions, n'ayant pu l'expulser en masse, un ennemi qui s'était furtivement introduit dans un domicile ou sa presence devait être importune et nuisible.* Of the humerus, there only remained some membranous rudiments of its head, and a great part of these seemed to belong to the pleura costalis." (See *Larrey's Mémoires de Chirurgie Militaire, Tom.* 2, *p.* 405—407.)

DISLOCATIONS OF THE FORE-ARM FROM THE HUMERUS.

Notwithstanding the extent of the articular surfaces of the radius and ulna with the os humeri, the strength of the muscles and ligaments surrounding the joint, and the mutual reception of the eminences, which makes it a perfect angular ginglymus, a dislocation of these two bones off the humerus, may take place at the same time. They are most frequently luxated backward; sometimes laterally, but very rarely forward: the latter luxation cannot occur without a fracture of the olecranon. Indeed, it is so uncommon, that neither Petit nor Desault ever met with it. The luxation backwards is facilitated by the small size of the coronoid process, which may slide behind the humerus, when this is forcibly pushed downwards and forwards, and ascend as high as the cavity, which receives the olecranon during the extension of the fore-arm.

Luxations laterally are much less frequent, and are always incomplete. The great extent of the articular surfaces in the transverse direction, the reciprocal union of their inequalities, and especially the strength of the ligaments and muscles, which, arising from the internal and external condyles of the inferior extremity of the humerus, go to the fore-arm and hand, give great strength to the articulation, and render it impossible to effect by any violence, a complete luxation laterally.

In the luxation backwards, the radius and ulna may ascend more or less behind the humerus; but the coronoid process of the ulna is always carried above the articular pulley, and is found lodged in the cavity destined to receive the olecranon. The head of the radius is placed behind and above the external condyle of the humerus. The annular ligament, which confines the superior extremity of the radius to the ulna, may be lacerated: in which case, even when the bones are reduced, it is difficult to keep them in their proper places, as the radius tends constantly to separate from the ulna.

This luxation always takes place from a fall on the hand; for, when we are falling, we are led by a mechanical instinct to bring our hands forwards to protect the body. If in this case the superior extremity, instead of resting vertically on the ground, be placed obliquely with the hand nearly in a state of supination, the repulsion which it receives from the ground will cause the two bones of the fore-arm to ascend behind the humerus, whilst the weight of the body pressing on the humerus, directed obliquely downwards, forces its extremity to pass down before the coronoid process of the ulna.

The fore-arm, in this luxation, is in a state of half-flexion, and every attempt to extend it occasions acute pain. The situation of the olecranon, with respect to the condyles of the humerus, is changed. The olecranon, which, in the natural state, is placed on a level with the external condyle, which is itself situated lower than the internal, is even higher than the latter.

This luxation may be mistaken for a fracture of the olecranon, of the head of the radius, or even of the inferior extremity of the humerus. Such a mistake is attended with very bad consequences; for, if the reduction be not effected before the end of fifteen or twenty days, it is often impossible to accomplish it afterwards. The swelling which supervenes in twenty-four hours after the accident, renders a diagnosis more difficult; but the olecranon and internal condyle, are never so obscured, that the distance between them cannot be found to be increased, though Boyer makes a contrary assertion. It is true, that the rubbing of the coronoid process and olecranon against the humerus, may cause a grating noise, similar to that of a fracture; and some attention is certainly requisite to establish a diagnosis between a fracture of the head of the radius, and a dislocation of the fore-arm backwards.

The following method of reducing the case is advised by Boyer:—The patient being firmly seated, an assistant is to take hold of the middle part of the humerus, and make the counter-extension, while another assistant makes extension at the inferior part of the fore-arm. The surgeon, seated on the outside, grasps the elbow with his two hands, by applying the fore-fingers of each to the anterior part of the humerus, and the thumbs to the posterior, with which he presses on the olecranon, in a direction downwards and forwards. This method will be in general successful. If the strength of the patient, or the long continuance of the luxation, render it necessary to employ a greater force, a fillet is to be applied on the wrist, to make extension, and a cushion is to be placed in the axilla, and the arm and trunk fixed, as is done in cases of luxation of the humerus.

A bandage may afterwards be applied, in the form of a figure of 8, and the arm is to be kept in a sling. The laceration which always takes place, is invariably followed by more or less swelling, which is to be combated by antiphlogistic means.

At the end of seven or eight days, when the inflammatory symptoms are nearly gone, the articulation is to be gently mov-

ed, and the motion is to be increased every day, in order to prevent an anchylosis, to which there is a great tendency.

In this luxation, the annular ligament which confines the head of the radius to the extremity of the ulna, is sometimes torn, and the radius passes before the ulna. In such cases, pronation and supination are difficult and painful, though the principal luxation has been reduced. The head of the radius may be easily replaced, by pressing it from before backwards, and it is to be kept in its place by a compress, applied to the superior and external part of the fore-arm. The bandage and compresses are to be taken off every two or three days, and re-applied. This is necessary, on account of the necessity of moving the articulation to prevent an anchylosis.

If the luxation be not soon reduced, it becomes irreducible; the heads of the radius and ulna grow to the back part of the humerus, and the patient can neither bend nor extend his arm. However, in certain cases, especially in young persons, some motion is acquired in time; the heads of the radius and ulna making in the humerus cavities, in which they perform some motions, but always imperfectly.

The luxation forwards should be treated as a fracture of the olecranon, with which it would be inevitably accompanied. It may be necessary, on account of the great injury done to the soft parts, to bleed the patient copiously, and put him on an antiphlogistic regimen.

As to the lateral luxations, either inwards or outwards, they are always incomplete, and easily discovered. They are reduced by drawing the humerus and fore-arm in contrary directions, and at the same time pushing the extremity of the humerus, and the two bones of the fore-arm in opposite directions.

These luxations cannot be produced without considerable violence; but when the bones are reduced, they are easily kept in their place. It will be sufficient to pass a roller round the part, to put the fore-arm in a middle state, neither much bent nor extended, and to support it in a sling. But much inflammation is to be expected from the injury done to the soft parts. In order to prevent it, or at least mitigate it, the patient is to be bled two or three times, and put on a low diet, and the articulation is to be covered with the lotio aq. litharg. acet. Boyer, however, has recommended emollient cataplasms. It is scarcely necessary to repeat, that the arm is to be moved as soon as the state of the soft parts will admit of it. (*Boyer's Leçons sur les Maladies Des Os, Tom.* 2.)

The dislocation of the fore-arm backward, is said to occur ten times as frequently as lateral luxations; and those forward are so rare, that no comparison whatever can be drawn. (*Œuvres Chirurgicales de Desault par Bichat, Tom.* 1.)

Lateral luxations have been divided into *complete*, that is, when the articular surfaces have entirely lost their state of reciprocal contact; and into *incomplete*, that is, when only one bone, or a part of it, is thrown off the humerus. But, what cause can operate with sufficient force to produce the first occurrence? The mischief would also be so great, were such a case to happen, that amputation would most likely be requisite.

The incomplete lateral luxation may be produced by a blow, which drives the upper part of the fore-arm violently outward, or inward. A footman, says Petit, in falling from a coach, had his arm entangled in the spokes of a wheel, and a dislocation outward was the consequence. Another man luxated his fore-arm inward, by falling from his horse and driving his arm against an uneven place.

When the ulna is pushed into the situation of the radius, the space, between the olecranon and internal condyle, is much greater, than is natural. These points of bone are always very distinguishable, let the joint be ever so much swollen; and hence, the information to be derived from an examination of them, may be obtained in every case, without exception. Also, when the ulna is pushed into the place of the radius, the latter bone cannot be easily rotated, nor can the fore-arm be bent, and extended, in a perfect manner.

The dislocation inward must be very uncommon, as the form of the bones is almost an insurmountable obstacle to such an accident. It may happen, however, as the authority of Petit confirms.

All recent dislocations of the elbow are very easily reduced, and as easily maintained so; for the reciprocal manner in which the articular surfaces receive each other, and their mutual eminences and cavities, will not readily allow the bones to become displaced again.

The application of a bandage in the form of a figure of 8, and supporting the arm in a sling, are proper in all these cases.

DISLOCATION OF THE RADIUS FROM THE ULNA.

The majority of authors, who have written on dislocations of the fore-arm, have not separately considered those of the radius. Some detached observations, on luxations of its superior extremity, are to be found here and there; a subject, which Duverney alone has fully treated of. The dislocations of its lower end,

which are more frequent, and easy of occurrence, have almost escaped the notice of French, and, also, English writers. At present, cases of this sort have been so numerously collected, that a particular account of them may be offered.

DIFFERENCE OF STRUCTURE, BETWEEN THE TWO JOINTS OF THE RADIUS WITH THE ULNA.

The radius, the moveable agent of pronation and supination, rolls round the ulna, which forms its immoveable support, by means of two articular surfaces; one above, slighly convex, broad internally, narrow outwardly, and corresponding to the little sigmoid cavity of the ulna, in which it is lodged; the other below, concave, semicircular, and adapted to receive the convex edge of the ulna. Hence, there are two joints, differing in their motions, articular surfaces, and ligaments. By ascertaining such differences, we shall be enabled to find out those, which exist between the luxations of the upper and lower head of the radius.

Above, the radius, in pronation and supination, only moves on its own axis; below, it rolls round the axis of the ulna. Here, being more distant from the centre, its motions must be both more extensive and powerful, than they are above. The head of the radius, turning on its own axis in the annular ligament, cannot distend it in any direction. On the contrary, below, the radius, in performing pronation, stretches the posterior part of the capsule, and presses it against the immoveable head of the ulna, which is apt to be pushed through, if the motion be forced. A similar event, in a contrary sense, takes place in supination. The front part of the capsule, being rendered tense, may now be lacerated.

Add to this disposition, the difference of strength between the ligaments of the two joints. Delicate, and yielding, below; thick, and firm, above; their difference is very great. The upper head of the radius, supported on the smaller immoveable articular surface of the ulna, it is protected from dislocation in most of its motions. On the contrary, its lower end, carrying along with it, in its motions, the bones of the carpus, which it supports, cannot itself derive any solid stability from them.

DIFFERENCES OF DISLOCATIONS OF THE RADIUS.

From what has been said, the following conclusions may be drawn: 1. That with more causes of luxation, the lower articulation of the radius has less means of resistance; and, that under the triple consideration of motions, ligaments tying the articular surfaces together, and the relations of these surfaces to each other, this joint must be very subject to dislocation. 2. That, for opposite reasons, the upper joint cannot be very subject to such an accident.

Indeed, what could be the cause producing it in this situation? Can it arise from a violent pronation, or supination? The lower joint being the weakest, would give way the first, and, however forcible any motion of this kind might be, the upper head of the radius would only be rotated on its own axis. How then can this part be dislocated, without being pushed forward, or backward? All the muscular and ligamentous support of the joint must be broken; and the muscles and ligaments are too strong to admit of this, and the motion itself too feeble. Can the accident originate from any impulse on the radius, from below upward. The immoveable resisting end of the humerus would then prevent the radius from quitting the capsular ligament. Can the accident arise from a violent extension, or flexion of the fore-arm. Here the whole force operating on the ulna, the radius scarcely feels the impulse.

Hence, accidental dislocations of the radius, suddenly produced by an external cause, must, if they ever happen, be exceedingly uncommon at its upper end. This is not the case, with respect to such dislocations, as occur slowly at this joint, especially in children, in whom the ligaments become lax in consequence of repeated efforts. With this kind of case, we have here nothing to do.

Experience sometimes seems to militate against the above reflections. Duverney quotes some instances of dislocations of the radius, suddenly produced by external causes. Some other practitioners mention similar examples. But, in their examinations, have these men paid all due attention? An analogous case has been transmitted to the French Academy of Surgery, by one of its fellows; but, doubts have arisen concerning its reality, and there are too few facts for, and too much presumptive evidence against, the truth of such cases, for their existence to be believed. Desault himself rejected their reality.

DISLOCATION OF THE LOWER END OF THE RADIUS.

The causes are the same, as those of all analogous cases. 1. Violent action of the pronator and supinator muscles. This is, doubtless, a very unusual cause, for Desault never knew an instance of it. 2. External force, moving the radius violently into a state of pronation, and rup-

turing the back part of the capsule; or into a state of supination, and breaking the front part of the capsular ligament.

Hence, there are two kinds of dislocation; one forward, the other backward. The first is very frequent; the second is much less so. The latter case never presented itself to Desault, but once, in the dead body of a man, who had both his arms dislocated, and no particulars could be learnt. The other case occurred very often in the practice of this eminent surgeon. Five examples have been published. Doubtless, this difference is owing to all the principal motions of the radius being in the prone direction.

This observation is confirmed by the fact, that the lower joint of the radius, in the dead subject, may be dislocated as easily by a supine, as a prone motion of this bone.

The symptoms of the luxation forward are: 1. Constant pronation of the fore-arm: 2. An inability to perform supination, and great pain on this being attempted: 3. An unusual projection at the back of the joint, in consequence of the protrusion of the little head of the ulna through the capsule: 4. The position of the radius is more forward, than natural: 5. Constant adduction of the thumb, which also is almost always extended: 6. A half-bent state of the fore-arm, and very often of the fingers. This, indeed, is the position, which the fore-arm usually assumes in all affections of its bones, and, in the present instance, the posture cannot be changed, without considerable pain: 7. More or less swelling around the joint. This sometimes comes on immediately after the accident, but always afterwards, if the reduction should remain unaccomplished. The condition of the joint may thus be obscured, and the accident mistaken for a sprain; as Desault often observed to have occurred with surgeons, who had been called to these accidents before him. The serious consequence of this mistake is, that no attempt at reduction is made, and the articular surfaces having time to contract adhesions, the disorder is frequently rendered irremediable.

A luxation of the radius backward is characterized by symptoms, the reverse of those above mentioned. They are, a violent supination of the limb; inability to put it prone; pain on making the attempt; a tumour in front of the fore-arm formed by the head of the ulna; a projection backward of the large head of the radius; and abduction of the thumb.

REDUCTION.

When the dislocation is forward, an assistant is to take hold of the elbow, raising the arm a little from the body; another is to take hold of the hand and fingers.

The surgeon is to take hold of the end of the fore-arm with both his hands; one applied to the inside, the other to the outside, in such a manner, that the two thumbs meet each other before, between the ulna and radius, while the fingers are applied behind. He is then to endeavour to separate the two bones from each other, pushing the radius backward and outward, while the ulna is held in its proper place. At the same time, the assistant, holding the hand, should try to bring it into a state of supination, and consequently the radius, which is its support. Thus pushed, in the direction opposite that of the dislocation, by two powers, the radius is moved outward, and the ulna returns into the opening of the capsule, and into the sigmoid cavity.

If chance should present a dislocation of the radius backward, the same kind of proceeding, executed in the opposite direction, would serve to accomplish the reduction. (See *Œuvres Chirurgicales de Desault, par Bichat, Tom.* 1.

DISLOCATIONS OF THE WRIST.

The carpal bones may be luxated from the lower ends of the radius and ulna forwards, backwards, inwards, or outwards. The two first cases, especially the one backwards, are the most frequent. The dislocation backwards is rendered easy by the direction of the convex articular surfaces of the scaphoid, semilunar, and pyramidal bones, which sloping more backwards than forwards, must make them more disposed to slip in this direction, than any other. The accident may be caused by a fall on the back of the hand, while much bent; in which event the first row of the carpal bones slide backwards into the oblong cavity of the radius, lacerate the posterior ligament, and form an eminence behind the lower ends of the bones of the fore-arm. This prominence, the depression in front of the wrist, and the extraordinary flexion of the hand, which cannot be extended, are the characteristic signs of this kind of dislocation. The dislocation forwards generally arises from a fall on the palm, the fingers being extended, and more force operating on the lower, than upper part of the palm. The luxation is seldom complete; and the hand remains painfully extended. The great many tendons, which run before the wrist, and the annular ligament, being pushed forward, the prominence formed by the carpal bones, in front of the ends of the radius and ulna, is not easily de-

tected, and the case may be mistaken for a sprain.

Dislocations inwards, or outwards, are never complete. The projection of the carpal bones at the inner, or outer side of the joint, and the distortion of the hand, make such cases sufficiently evident.

All dislocations of the wrist are very easy of reduction. For this purpose, gentle extension must be made, while the two surfaces of the joint are made to slide on each other in a direction contrary to what they took when the accident occurred.

Dislocations of the wrist are always attended with a great deal of spraining of numerous tendons, and laceration of ligaments, and consequently considerable swelling generally follows, and the patient is a long time in regaining the perfect use of the joint. To relieve the symptoms as much as possible, the best plan is to keep the hand and wrist continually covered with linen wet with the saturnine lotion, and to put the fore-arm and hand in splints, as in the case of a fracture. See *Fractures of the Fore-arm.* The arm must also be kept perfectly at rest in a sling.

When the ruptured ligaments have united, the use of liniments will tend to remove the remaining stiffness and weakness of the joint.

DISLOCATIONS OF THE BONES OF THE CARPUS AND METACARPUS.

A dislocation of the carpal bones from each other seems almost impossible. The os magnum, however, has been known to be luxated from the deep cavity formed for it by the scaphoides and semilunare, in consequence of too great a flexion of the bones of the first phalanx on those of the second, and it formed a tumour on the back of the hand. (*Chopart*; *Boyer*; *Richerand.*)

The metacarpal bones are never luxated from each other. The first one is sometimes, though very rarely, pushed off the trapezium.

DISLOCATIONS OF THE FINGERS.

The first phalanges may be dislocated backwards off the heads of the metacarpal bones. A luxation forwards would be very difficult, if not impossible, because the articular surfaces of the metacarpal bones extend a good way forwards, and the palm of the hand makes resistance to such an accident. The first phalanges of the thumb and little finger can alone be dislocated inwards; and the first phalanx of the thumb is alone subject to be luxated outwards. This phalanx is also most liable to dislocations backwards, behind the head of the first metacarpal bone, in which case it remains extended, while the second is bent.

These dislocations should be speedily reduced; for, after eight or ten days, they become irreducible. In a luxation of the first bone of the thumb, which was too old to be reduced, Desault proposed cutting down to the head of the bone, and pushing it into its place with a spatula. Dislocations of the thumb and little finger inwards, that of the thumb outwards, and luxations of the first phalanges of the other fingers backwards, are all reduced by making extension on the lower end of the affected thumb, or finger. The first and second phalanges may also be dislocated backwards.

After the reduction, the thumb, or finger, affected, should be rolled with tape, and incased, and supported in pasteboard, till the lacerated ligaments have united; care being taken to keep the hand and fore-arm quietly in a sling.

DISLOCATIONS OF THE BONES OF THE PELVIS.

M. Louis, in Tom. 4, of the *Mem. de l'Acad. de Chirurgie*, 4*to.* relates a case, in which the os ilium of the right side was found separated from the sacrum, so as to pass nearly three inches behind it. This accident was caused by a very heavy sack of wheat falling on a labourer, and the truth of it was ascertained by dissection. Such a case must be exceedingly uncommon.

The os coccygis is not so easy dislocated as fractured. Boyer, however, has seen it displaced in a man, who was greatly emaciated by disease. This subject had considerable ulcerations about the coccyx, and the bone itself was bare. There was an interspace of nearly two inches, between the sacrum and base of the os coccygis. In proportion as the man regained his strength the bone recovered its right position; and at length united to the os sacrum, notwithstanding the action of the levatores ani, which are inserted into it. (*Boyer.*) This case, however, was not an accidental luxation; and it clearly arose from the destruction of the ligaments by disease.

Authors mention two kinds of dislocation, to which the os coccygis is liable, one inward, the other outward. The first is always occasioned by external violence; the second, by the pressure of the child's head in difficult labours. The nature of these accidents is easily discovered by the preceding cause, and by an examination with the fingers, externally, and within the rectum. Pain, difficulty of voiding the fœces and urine, tenesmus, and inflammation, sometimes ending in

abscesses, which interest the rectum, are symptoms, said to attend and follow dislocations of the os coccygis.

These luxations are easily reduced, by means of a finger in the rectum, assisted by the other fingers externally. No more can be done, than in the case of a fracture. (See *Fracture.*)

DISLOCATION OF THE RIBS.

J. L. Petit was silent on this subject, as he thought such cases never occurred. Since his death, a French surgeon, Buttet, has related an instance, which he supposed to be a dislocation of the posterior extremity of the rib from the vertebræ; but, Boyer clearly shews he had no true reasons for this opinion, and that the case was only a fracture of the neck, or end of the bone, near the spine.

Ambrose Paré, Barbette, Junker, Platner, and Heister, not only admit the occurrence of luxations of the ribs; but, describe different species of them. Lieutaud also termed cases, in which the head of the rib was separated by disease, luxations. On the whole, we may conclude, that the ribs are so rarely dislocated, that the subject is not deserving of much attention in this work.

DISLOCATIONS OF THE THIGH-BONE.

The head of the thigh-bone may be dislocated upwards and outwards on the dorsum of the ilium; upwards and forwards on the body of the os pubis; downwards and inwards on the foramen ovale; and downwards and outwards on the os ischium.

The dislocation upwards and outwards, and the one downwards and inwards, are the most frequent. First, of luxations on the ilium.

The common kind of dislocation of the thigh-bone, upward and outward, is attended with the following symptoms. The affected thigh is shorter, than its fellow, is a little bent, and carried inwards. The knee inclines more forwards and inwards, than the opposite one; the leg and thigh are turned inwards, and the foot points in this direction. The trochanter major is brought nearer the anterior superior spinous process of the os ilium, and is at the same time elevated and carried a little forwards. The natural length of the limb cannot be restored, without reducing the luxation; the foot cannot be turned outwards, and any attempt to do so causes pain; but, the inclination of the foot inwards may be increased. (*Boyer.*)

This luxation has nothing in common with a fracture of the neck of the thigh-bone, except the shortness of the limb. The cases are at once discriminated by this difference, that, *in this kind of luxation, the limb and toes are turned inwards, while in all fractures of the thigh-bone, they are invariably turned outwards.*

Many writers have been puzzled how to account for the toes being inclined inwards. We have only to reflect, however, that the trochanter major is situated forwards, and that the head of the bone lies backwards, when we shall immediately perceive, that the limb is mechanically prevented from being rotated outwards.

To reduce this dislocation, the patient should be placed on his opposite side upon a table firmly fixed, or a large four-posted bedstead. A sheet, folded longitudinally, is first to be placed under the perineum, and one end being carried behind the patient, the other, before him, they are to be fastened to one of the legs, or posts of the bed. Thus the pelvis will be fixed, so as to allow the necessary extension of the thigh-bone to be made. Great care must be taken during the extension to keep the scrotum and testicles from being hurt, or the pudenda in women, by the sheet passed under the perineum. The patient must be further fixed by being held by assistants.

The best practitioners of the present day in France, advise the extending force to be applied to the inferior part of the leg, in order to have it as far as possible from the parts, which resist the return of the head of the bone into its natural situation. In this country, surgeons generally prefer making the extension by means of a sheet, fastened round the limb just above the condyles of the os femoris. As soon as the head of the bone has been brought on a level with the acetabulum by the assistants, who are making the extension, the surgeon is to force it into this cavity by pressing on the great trochanter.

The extension should always be made in a gradual and unremitting manner: at first, gently; but afterwards more strongly; yet never violently. The difficulty of reduction arises from the great power and resistance of the muscles, and these must at length be fatigued, so as to yield to the extending force, if care be taken, that it be maintained the necessary time, without the least intermission.

In very strong, athletic subjects, it may be proper to bleed them, in order to produce a temporary weakness, for the purpose of facilitating the reduction.

The disappearance of all the symptoms, and the noise made by the head of the bone, when it slips into the acetabulum, denote, that the reduction is effected. The bone is afterwards to be kept from slipping out again, by tying the patient's thighs together

with a bandage placed a little above the knees. The patient should be kept in bed at least three weeks; live low, and rub the joint with the *linimentum camph. et saponis*. Due time must be given for the lacerated ligaments to unite, and the sprained parts to recover; and premature exercise may bring on irremediable disease in the joint.

Mr. Hey gives the following directions, and description of the way, in which he reduced a case of this kind.

"The extension of the limb must be made in a right line with the trunk of the body; and, during the extension, the head of the bone must be directed outwards as well as downwards. A rotatory motion of the os femoris on its own axis, towards the spine, (the patient lying prone) seems likely to elevate the great trochanter, bring it nearer to its natural position, and direct the head of the bone towards the acetabulum. These circumstances led to the following method. A folded blanket was wrapped round one of the bed-posts, so that the patient, lying in a prone position, and astride of the bed-post, might have the affected limb on the outside of the bed. The bed was rendered immoveable, by placing it against a small iron pillar, which had been fixed for the purpose of supporting the curtain rods. The leg was bent to a right angle with the thigh, and was supported in that position by Mr. Lucas, who, when the extension should be brought to a proper degree, was to give the thigh its rotatory motion, by pushing the leg inwards, that is, towards the other inferior extremity. Mr. Jones sat before the patient's knee, and was to assist in giving the rotatory motion, by pushing the knee outwards at the same moment. I sat by the side of the patient, to press the head of the bone downwards and outwards during the extension. Two long towels were wrapped round the thigh just above the condyles, one towel passing on the inside of the knee, the other on the outside. Three persons made the extension; but when we attempted to give the thigh its rotatory motion, we found it confined by the towel which passed on the inside of the knee and leg. We therefore placed both the towels on the outside; and in this position the extending force concurred in giving the rotatory motion. The first effort that was made, after the towels were thus placed, had the desired effect, and the head of the bone moved downwards and outwards into the acetabulum." (*Hey's Practical Observations*, *p.* 313.)

There is another kind of dislocation upward and outward, so rare, that many experienced men have never seen it, and few have mentioned it. I allude to the case, in which the head of the thigh-bone is so situated on the dorsum of the ilium, that it lies forward, the trochanter major backward, and an instance of which I have myself seen in St. Bartholomew's hospital. This case deserves very particular attention, because being attended with a considerable turning of the toes outwards, as well as a shortening of the limb, it is the only example, which is at all likely to be mistaken for a fracture of the neck of the thigh-bone. The case, however, is not difficult of detection; for, you can even feel the head of the bone projecting forward on the ilium, and you cannot rotate the limb inwards, which can be done in cases of fracture, though doing so is productive of immense suffering.

This rare kind of luxation is to be reduced by the same means, and in the same manner, as the common dislocation upwards and outwards, already treated of.

Another of the most frequent luxations of the thigh-bone, is downwards and inwards, upon the obturator foramen. The occurrence of this accident is facilitated by the great extent of the motion of abduction of the thigh; by the notch at the inferior and internal part of the acetabulum; by the weakness of the orbicular ligament on this side; and by the ligamentum teres not opposing, nor being necessarily ruptured by it. The head of the bone is thrown between the obturator ligament, and obturator externus muscle.

The symptoms are as follow: the affected thigh is longer, than the sound one; the head of the femur being situated lower than the acetabulum, the trochanter major is removed to a greater distance from the anterior superior spinous process of the ilium, and the thigh is flattened, in consequence of the elongation of the muscles. A hard, round tumour is felt at the inner and superior part of the thigh, formed by the head of the femur. The leg is slightly bent; and the knee and foot, are turned outwards, and cannot be brought back into their proper direction.

This case, like a fracture, is attended with a turning of the toes outwards; but, besides being easy of discrimination on every account, the elongation of the limb at once denotes, that there is no fracture, which always causes a shortening of the member.

Dislocations on the obturator foramen, are very easy of reduction. The extension is to be made downwards and outwards, so as just to dislodge the head of the bone, and then the muscles generally draw it into the acetabulum, on the extending force being gradually relaxed, and the surgeon pushing the upper part of the bone outward.

The thigh-bone is sometimes, though very seldom, luxated upwards and forwards, into the groin. The whole limb

is turned outwards and shortened; the trochanter major is approximated to the anterior superior spinous process of the ilium; the head of the bone forms a tumour in the groin, and, pressing on the anterior crural nerves, causes great pain, numbness, and even paralysis; and the knee is carried backwards.

The head of the bone felt in the groin; the inclination of the knee backwards; and the impossibility of rotating the limb inward; distinguish it from a fracture of the neck of the bone.

It is reduced in the same way, as the luxation downwards and forwards.

Mr. Hey says, that "In this species of dislocation, (downwards and forwards,) as the head of the bone is situated lower than the acetabulum, it is evident, that an extension made in a right line with the trunk of the body, must remove the head of the bone farther from its proper place, and thereby prevent, instead of assisting, reduction. The extension ought to be made with the thigh at a right angle, or inclined somewhat less than a right angle, to the trunk of the body. When the extension has removed the head of the bone from the external obturator muscle, which covers the great foramen of the os innominatum, the upper part of the os femoris must then be pushed or drawn outwards; which motion will be greatly assisted by moving the lower part of the os femoris, at the same moment, in a contrary direction; and, by a rotatory motion of the bone upon its own axis, turning the head of the bone towards the acetabulum." (*Hey*, 316.)

The ensuing case illustrates Mr. Hey's practice.

"The lower bed-post, on the right side of the bed on which the patient lay, was placed in contact with a small immoveable iron pillar (about an inch square in thickness), such as in our wards are used for supporting the curtain rods of the beds. A folded blanket being wrapped round the bed-post and pillar, the patient was placed astride of them, with his left thigh close to the post, and his right thigh on the outside of the bed. A large piece of flannel was put between the blanket and the scrotum, that the latter might not be hurt during the extension.

"The patient sat upright, with his abdomen in contact with the folded blanket which covered the bed-post. He supported himself by putting his arms round the post, and an assistant sat behind him to prevent him from receding backwards. He was also supported on each side.

"Two long towels were put round the lower part of the thigh, after the part was well defended from excoriation by the application of a flannel roller. The knot, which the towels form, was made upon the anterior part of the thigh, that the motion intended to be given to the leg might not be impeded by the towels.

"The thigh being placed in a horizontal position, or rather a little elevated, with the leg hanging down at right angles to the thigh, I sat down upon a chair, directly fronting the patient, and directed a gentle extension to be made by the assistants standing at my left side. This was done with the view of drawing the head of the bone a little nearer to the middle of the thigh, and the extension had this effect. I then placed the two assistants, who held the towels, at my right side, by which means the extension would be made in a direction a little inclined to the sound limb. Mr. Logan stood on the right side of the patient, with his hands placed on the upper and inner side of the thigh, for the purpose of drawing the head of the bone towards the acetabulum, when the extension should have removed it sufficiently from the place in which it now lay.

"I desired the assistants to make the extension slowly and gradually; and to give a signal when it arrived at its greatest degree. At that moment, Mr. Logan drew the upper part of the bone outwards, while I pushed the knee inwards, and also gave the os femoris a considerable rotatory motion, by pushing the right leg towards the left. By these combined motions, the head of the os femoris was directed upwards and outwards, or, in other words, directly towards the acetabulum, into which it entered at our first attempt made in this manner.

"The scrotum, as the patient assured me, was not hurt in the least by the extension." (*Hey*, *p.* 318.)

The last dislocation of the thigh remaining to be spoken of, is that downwards and backwards. The head of the bone rests against that part of the ossa innonimata where the ilium and ischium join. The limb is turned outwards. When the luxation is primary, the extremity is lengthened. A hard tumour is felt at the posterior and inferior part of the buttock, and the great trochanter is removed further from the spine of the ilium. When secondary (which is far more frequent), the primary luxation having been upwards and outwards, the foot is turned inwards. The primary luxation downwards and backwards, with the toes turned outwards, is as unusual, as the case upwards and backwards, with the foot in the same position. The lengthening of the limb, however, at once shews the case not to be a fracture,

The pelvis being fixed, as already described, the extension is to be made downwards and forwards, to dislodge the head of the bone, while the surgeon, with a napkin, placed just below the trochanter

minor, pulls the upper part of the femur towards the acetabulum.

DISLOCATIONS OF THE PATELLA.

This bone may be luxated either inwards or outwards, when violently pushed in this direction. The luxation outward is the most frequent, because the bone more easily slips in this direction off the outer condyle of the femur, than inwardly. All these cases are easily reduced, on relaxing the extensors of the leg, and bending the thigh; but, owing to a relaxed state of the ligament of the patella, or other predisposing causes, the bone is sometimes difficultly kept in its proper situation, without applying a roller to the part. The inflammatory affection of the joint is to be opposed by bleeding, purging, and using the saturnine lotion. The joint must be kept quiet a few days, and then gently moved in order to prevent stiffness.

DISLOCATIONS OF THE KNEE.

The tibia may be luxated forward, backward, or to either side.

The dislocation backward is always incomplete, and sometimes is secondary, being a consequence of white swellings.

The luxation forward is even more rare, than the one backward. Dislocations inward, or outward, are the most frequent, and are always incomplete. The nature of all these cases is so conspicuous at first view, that there is no need of any detail of particular symptoms.

The bones of the leg are sometimes twisted outward, and the internal lateral ligament ruptured; but, this may happen without the crucial ligament being broken. On the other hand, when the bones of the leg are violently twisted inward, both the crucial ligaments, and external lateral ligament, must inevitably be ruptured.

These accidents are all most easily reduced, on making gentle extension, and pushing the head of the tibia in the proper direction. The grand object, after the reduction, is to avert inflammation of the knee, and promote the union of the torn ligaments. The first demands the rigorous observance of the antiphlogistic plan; both require the limb to remain perfectly motionless, supported by one, or two splints. As soon as the ligaments have grown together, and the danger of inflammation is over, which will be in about three weeks, the joint should be gently bent and extended a certain time every day in order to prevent stiffness. Liniments will now also be of service.

DISLOCATIONS OF THE FOOT.

The foot may be dislocated inwards, or outwards; forwards, or backwards; and either of these luxations may be complete, or incomplete. Dislocations inwards, and outwards, are the most common; the former occurring, however, more frequently, than the latter, which are greatly resisted by the lowness of the malleolus externus.

Many of these accidents are *compound*; that is, attended with a wound communicating with the joint; a circumstance that greatly increases the danger, and is frequently the occasion of the patient's losing his limb, and even his life. It is only, however, when the soft parts are very much contused, and extensively lacerated, that amputation should be had recourse to in the first instance. When the bones are reduced, and the edges of the wound brought into contact, the unpromising aspect of the case is very much diminished, and many, who might think amputation advisable at first view of the accident, would change their mind, as soon as the bones have been replaced.

Dislocations inwards, or outwards, are very easily reduced, and require very little extension. In accomplishing the reduction, it is best to relax the strong muscles of the calf by bending the leg on the thigh. The case is afterwards to be treated in the same way as a fracture of the leg.

Mr. Pott has called the attention of surgeons to a particular kind of dislocation, in which the utility of relaxing the muscles, is strikingly illustrated. I mean the instance, in which, "by leaping, or jumping, the fibula breaks in the weak part already mentioned, that is, within two or three inches of its lower extremity. When this happens, the inferior fractured end of the fibula falls inward towards the tibia, that extremity of the bone which forms the outer ankle, is turned somewhat outward and upward, and the tibia having lost its proper support, and not being of itself capable of steadily preserving its true perpendicular bearing, is forced off from the astragalus inwards; by which means the weak bursal, or common ligament of the joint, is violently stretched, if not torn, and the strong ones, which fasten the tibia to the astragalus and os calcis, are always lacerated; thus producing at the same time a perfect fracture and a partial dislocation, to which is sometimes added, a wound in the integuments, made by the bone at the inner ankle. By this means, and indeed as a necessary consequence, all the tendons which pass behind or under, or are attached to the extremities of the tibia and fibula, or os calcis, have their natural direction and disposition so altered, that, instead of performing their appointed actions, they all contribute to the distortion

of the foot, and that by turning it outward and upward.

"When this accident is accompanied, as it sometimes is, with a wound of the integuments of the inner ankle, and that made by the protrusion of the bone, it not unfrequently ends in a fatal gangrene, unless prevented by timely amputation; though I have several times seen it do very well without. But in its most simple state, unaccompanied with any wound, it is extremely troublesome to put to rights, still more so to keep it in order, and, unless managed with address and skill, is very frequently productive both of lameness and deformity ever after.

"After what has been said, a farther explanation why this is so, is unnecessary. Whoever will take even a cursory view of the disposition of the parts, will see that it must be so. By the fracture of the fibula, the dilatation of the bursal ligament of the joint, and the rupture of those which should tie the end of the tibia firmly to the astragalus and os calcis, the perpendicular bearing of the tibia on the astragalus is lost, and the foot becomes distorted; by this distortion the direction and action of all the muscles already recited are so altered, that it becomes (in the usual way of treating this case) a difficult matter to reduce the joint; and, the support of the fibula being gone, a more difficult one to keep it in its place after reduction. If it be attempted with compress and strict bandage, the consequence often is a very troublesome, as well as painful ulceration of the inner ankle, which very ulceration becomes itself a reason why such kind of pressure and bandage can be no longer continued; and if the bone be not kept in its place, the lameness and deformity are such, as to be very fatiguing to the patient, and to oblige him to wear a shoe with an iron, or a laced buskin, or something of that sort, for a great while, or perhaps for life.

"All this trouble, pain, difficulty, and inconvenience, are occasioned by putting and keeping the limb in such position as necessarily puts the muscles into action, or into a state of resistance, which in this case is the same. This occasions the difficulty in reduction, and the difficulty in keeping it reduced; this distorts the foot, and by pulling it outward and upward makes that deformity which always accompanies such accident; but if the position of the limb be changed, if by laying it on its outside, with the knee moderately bent, the muscles forming the calf of the leg, and those which pass behind the fibula, and under the os calcis, are all put into a state of relaxation and non-resistance, all this difficulty and trouble do in general vanish immediately; the foot may easily be placed right, the joint reduced, and by maintaining the same disposition of the limb, every thing will in general succeed very happily, as I have many times experienced." (*Pott.*)

It occasionally happens in compound luxations of the ankle, that the astragalus only remains attached by a few fibres, in which circumstance, if it be judged prudent to attempt the preservation of the limb, it is best to imitate Ferrand and Desault, by extirpating this bone entirely, so as to allow the tibia to become anchylosed to the upper surface of the os calcis.

Dislocations forwards and backwards are not very common. The first case is the most difficult to produce.

The facility, with which all dislocations of the ankle are recognized by surgeons, acquainted with anatomy, renders a particular account of the symptoms quite superfluous.

Both the latter cases are easy of reduction, when care is taken to relax the muscles of the calf, which attention is most particularly essential to prevent the bones from becoming displaced again. The limb must be put in splints, just as if the case were a fracture.

The os calcis and astragalus are so intimately connected, that they are never completely luxated from each other. But, one, or both of these bones may be dislocated from the scaphoides and cuboides by violent force, when the forepart of the foot is fixed. (*J. L. Petit.*) The astragalus and os calcis, particularly the former, may then be luxated upwards into the cavity on the back of the scaphoides, so as to form a tumour on the back of the foot. The reduction is difficult: Boyer in one case could not succeed: but no lameness remained with the deformity.

The first phalanx of the great toe is sometimes dislocated from the first metatarsal bone. The reduction is too simple to need explanation.

On the subject of Dislocations, consult *Duverney's Traité des Maladies des Os. Leçons sur les Maladies des Os rédigées en un Traité complet de ces Maladies par Richerand, Tom.* 2. *Richerand's Nosographie Chirurgicale, Tom.* 3. *p.* 193, &c. *Edit.* 2. *Petit, Traité des Maladies des Os. Œuvres Chirurgicales de Desault, par Bichat, Tom.* 1. *Pott's Remarks on Fractures and Dislocations. Hey's Practical Observations in Surgery. Kirkland's Observations upon Mr. Pott's General Remarks on Fractures, &c. White's Cases in Surgery. Medical Observations and Inquiries, Vol.* 2. *Bromfield's Chirurgical Cases and Observations. Levéillé, Nouvelle Doctrine Chirurgicale, Tom.* 2. *Callisen, Systema Chirurgiæ Hodiernæ, Tom.* 2. *Desault's Journal de Chirurgie.*

DISTICHIA, or DISTICHIASIS. (from δὶς, twice, and στίχος, a row.) Gorrhæus,

Heister, and St. Ives, agree in applying this term to an affection of the eyelids, in which each tarsus has a double row of eye-lashes, which, inclining inward, irritate the eye, and keep up an ophthalmy. Such authors speak of this, as a very frequent complaint; but, the author of the present article in the *Encyclopédie Méthodique, Partie Chirurgicale*, remarks, that he has never met with it at all, though in ulcerations of the eyelids, he has often seen a certain number of the eye-lashes incline inward, and cause a good deal of disturbance to the eye, already in a state of inflammation. This disorder cannot be called the true distichiasis. However it may be, all writers recommend plucking out such eye-lashes, as assume an unnatural direction. A few of the hairs are to be taken out at a time, one after the other, and a few days are to be allowed to elapse, before this trivial operation is to be repeated. In order that the eye-lashes may be, with more certainty, extirpated to their roots, and that others may not grow in the same situation, it is advised to touch the places, from which they grow with the argentum nitratum. (See *Trichiasis.*) *Encyclopédie Méthodique, Partie Chirurgicale.*

DISTORTION. (from *distorqueo*, to wrest aside.) *Distortio.* The bones of the limbs frequently become distorted, in consequence of an unhealthy, ricketty, or scrofulous constitution. Sometimes, they are deformed merely by the contraction of the muscles; and, very frequently, they are naturally distorted by the feet being either turned too much outward, or inward. Mere weakness will sometimes occasion a distortion; for when a child is too soon put to walk, its legs will become crooked from the bones not being strong enough to bear the weight of the body.

Distortions of the limbs are much more easily cured, than those of the spine. As they appear in infancy, when the bones are flexible, they can easily be brought into their proper shape by using machines, sometimes of a very simple kind; but it must always be remembered, that, as the disease, in cases, in which the limbs are not naturally distorted from birth, proceeds from weakness, we must not omit to strengthen the system by tonics. Sometimes, a gentle and long continued pressure will be sufficient to make a bone straight; but, generally, some kind of machines, or shoes, or boots, of a particular construction, are necessary.

When the limbs are distorted, by reason of a contraction of the muscles, emollient oils are highly recommended. The muscles and tendons, which are supposed to cause the deformity, are to be rubbed throughout their course, for half an hour, or more, three times a day, during which frequent endeavours must be made to extend the limb; but, gradually, and without violence.

Latta's System of Surgery, Vol. 2, 467, 468. See *Mollities Ossium; Rachitis; Vertebræ, Diseased; Vari and Valgi.*

DOLO'IRES. The spiral turns of a roller.

DURA MATER, FUNGOUS TUMOURS OF. The dura mater, the outer membrane of the brain, was so named by the ancients, on account of its hardness, and its being formerly supposed to be the source of all the other membranes of the body.

Fungous tumours of the dura mater, which have only had their nature understood about half a century, have not, however, escaped the notice of the ancient writers; but, the disease is very imperfectly described by them, and under an erroneous denomination. They supposed, that the swelling was of the encysted kind, or what they termed *natta, talpa, testudo*, and that it gradually altered and destroyed the cranium. They sometimes mistook the fungous, or sarcomatous tumour of the dura mater for coagulated blood, or for ill-conditioned excrescences, like those which make their appearance on ulcers attended with caries. Such are the ideas, which seem to be conveyed by some imperfectly detailed cases in the writings of Lanfranc, Guido di Cauliaco, Theodoricus, and other authors of the thirteenth and fourteenth centuries. Amatus Lusitanus has given the appellation of lupus with caries to a fungous tumour of the dura mater. The swelling occurred in a child eight years old, who died in convulsions, two days after an opening had been made in it.—(*Centur.* 5, *obs.* 8.) Another similar case, which happened in a child, and was noticed by Camerarius at Paris, is stiled a singular bony excrescence. (*Ephemer. curios. natur. decur.* 2, *ann.* 6, 1687, *obs.* 99.) Lastly, Cattier, a physician of Montpellier, has recorded the history of a lady, who died from the consequences of a fungous tumour of the dura mater. The disease was so acutely painful, as to compel the patient to cry out. The swelling was opened with caustic. Pimprenelle, a Parisian surgeon, recommended the trepan to be employed; but, his advice was over-ruled. After death, a fungous of the dura mater, with a perforation in the skull, was detected, and it is described by the author as a hard stony, substance, accompanied with points and asperities. (*Obs. Med. obs.* 15, *p.* 48.—See *Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 498. *Edit.* 1809.)

The old surgeons, being ignorant of

the real character of fungous tumours of the dura mater, used often to commit the most serious and fatal mistakes in the treatment. These diseases are of a chronic nature, and make their appearance gradually, in the form of a tumour, which makes its way through the bones of the cranium, rises up, and insensibly blends itself with the integuments, which seem, as it were, to make a part of it. Such fungous tumours of the dura mater may originate spontaneously at any part of this membrane; but, they are particularly apt to grow on the surface, which is adherent to the upper part of the skull, or to its basis. They are firm, indolent, and chronic, seeming, as if they were the consequence of slow inflammation, affecting the vessels, which supply the dura mater, and inoseulate with those of the diploe. It is very difficult, one might say, impossible, to determine, whether, in an affection of this kind, the disease begins in the dura mater, or the substance of the bone itself. The general belief, however, is, that the bone is affected secondarily, and the disorder originates in the dura mater. The patient, who is the subject of the first case, related in a memoir by M. Louis, had received no blow upon the head, and, could only impute his complaint to a fall, which he had met with four, or five months before, and in which the head had not struck against any thing; but, from this time, he experienced a stunning sensation, which continued till he died. The cranium and dura mater were found both equally diseased. Though this case may tend to shew, that fungous tumours of the dura mater may form spontaneously, yet, it is not the less confirmed by the examination of a vast number of cases, that this affection more frequently follows blows on the head, than any other cause. Hence, a slow kind of thickening of the dura mater is produced, which ends in a sarcomatous excrescence, the formation of which always precedes the destruction of the bone. In the memoir, published by M. Louis in the fifth volume, 4to. of those of the Royal Academy of Surgery, there is a very interesting case, illustrating the nature of the present disease.

The subject was a young man, aged twenty-one, who had a considerable tumour on the left side of the head, which was taken for a hernia cerebri. (*See this Article.*) The swelling had begun in the region of the temple, and had gradually acquired the magnitude of a second head. The external ear was displaced by it, and pushed down as low as the angle of the lower jaw. At the upper part of the circumference of the base of the tumour, the inequalities of the perforated bone, and the pulsations of the brain, could be distinctly felt. Some parts of the mass were elastic and hard, others were soft and fluctuating. A plaster, which had been applied, brought on a suppuration at some points, from which an ichorous matter was discharged. Shiverings and febrile symptoms ensued, and the man died in less than four months, in the year 1764. On dissection, a sarcomatous tumour of the dura mater was detected, together with a destruction of the whole portion of the skull, corresponding to the extent of the disease.

When a tumour of this nature has decidedly formed, it makes its way outward through all the parts, soft or hard, which are opposed to it. The swelling, in becoming circumscribed, is partly blended with the dura mater, and its pressure produces an absorption of such parts of the skull, as oppose its enlargement. It unexpectedly elevates itself externally, confounding itself with the scalp, and presents itself outwardly in the form of a preternatural, soft, yielding swelling, which even sometimes betrays an appearance of a decided fluctuation, or a pulsation, which leads some to suppose it to be an aneurismal tumour. When once the swelling has made its exit from the cavity of the cranium, it expands on every side under the integuments, which readily make way for its growth. The scalp becomes distended, smooth, and œdematous over the extent of the tumour, and lastly it ulcerates. The matter, which is discharged from the ulcerations, is thin and sanious; the outer part of the tumour is confounded with the integuments and edges of the skull, on which it rests, so that, in this state, it is easy to mistake the tumour for one, whose base is altogether external, While the swelling thus increases in size externally, it also enlarges internally. The latter change takes place in particular, while the opening in the cranium is not large enough to admit the whole mass of the tumour, which then depresses the brain, and lodges in the excavation, which it forms for itself. But, this cavity quickly diminishes, and becomes reduced almost to nothing, as soon as the tumour projects outwardly. The tables of the skull are absorbed to make way for the swelling to arrive externally; but, it is remarked, that the internal, or vitreous table, is always found much more extensively destroyed, than the external one. Sometimes, new bony matter is found deposited around the opening in the cranium.

It is asserted, that, whatever may be the situation of a fungous tumour of the dura mater, the outer layer of this membrane, upon which the diseases forms, is alone altered, the inner layer and the pia mater being always unchanged. (*Lassus,*

Pathologie Chirurgicale, Tom. 1, *p.* 501. *Edit.* 1809.)

According to surgical writers, fungous tumours of the dura mater have been caused by contusions of the skull, falls on the buttocks, concussions of the head or whole body, lues venerea, scrofula, inveterate rheumatism, &c. The three last of the alledged causes, however, seem to be little better than mere conjecture.

Children of the most tender years are even liable to the disease. M. Louis has related, that a child, two years of age, died of a fungus of the dura mater, which had produced a swelling above the right ear, attended with a destruction of a portion of the parietal and temporal bones. (*Mém. de l'Acad. de Chirurgie, Tom.* 5, 4*to. p.* 31.)

The existence of a fungous tumour of the dura mater cannot be ascertained, as long as there is no external change. The effects, produced, may originate from so many causes, that there would be great risk of a gross mistake in referring them to any particular ones. This is not the case, when there is an opening in the skull. Then a hardness, felt from the very first at the circumference of the tumour, denotes that it comes from within. When the swelling is carefully handled, such a crackling sensation is perceived, as would arise from touching dry parchment stretched over the skin. On making much pressure, pain is occasioned, and sometimes a numbness in all the limbs, stupefaction, and other more or less afflicting symptoms. The tumour, in some measure, returns inward, especially, when not very large, and gradually rises up outward again, when the pressure is discontinued. Sometimes, there is pain; at other times, there is none; which may be owing to the manner, in which the tumour is affected by the edges of the bone, through which it passes. The pain is often made to go off by compression, but returns as soon as this is taken off. The tumour has an alternate motion, derived from the pulsation of the brain, or of the large arteries at its base. This throbbing motion has led many into error, by making them mistake the disease for an aneurism, as happened in the second case, related in the memoir of M. Louis. When the tumour is pushed sideways, and the finger carried between it and the edge of the bone, through which the disease protrudes, the bony edge may be felt, touching the base of the swelling, and more or less constricting it. This symptom, when distinguishable, added to a certain hardness and elasticity, and sometimes a facility of reduction, forms a pathognomonic mark, which cannot deceive. By uniting all the preceding symptoms, and exercising, in the investigation, the spirit of combination, so necessary in these difficult cases, fungous tumours of the dura mater may be discriminated from hernia of the brain, external fleshy tumours, abscesses, exostoses, and other affections, which at first sight resemble them.

Generally speaking, fungous tumours of the dura mater are very dangerous, as well on account of their nature, as of the difficulty of curing them in any certain manner, and of the internal and external disorder, which they may occasion. Such as have a pedicle, the base of which is not extensive; which are firm in their texture, without much disease in the surrounding bone, are moveable, not very painful, and in persons, who are, in other respects quite well, are in general reputed to be the least perilous. These are the cases, in which a cure may be attempted, with a hope of success, though the event is always exceedingly doubtful.

When the contrary of what has been just related occurs, when the disease is of long continuance, and the brain already affected, nothing favourable can be expected.

Compression is the most simple means of cure, and that which has naturally occurred to such practitioners, as have mistaken the disease for an aneurism, or a hernia cerebri. The efficacy of this method has been further misconceived, because the tumour, when not very large, has sometimes been partly, or even wholly reduced, without any bad consequences. This had no little share in leading to errors, concerning the true character of the disease. But, as might be conceived, this reduction, only being attended with temporary success, and having no effect whatever on the original cause of the affection, the symptoms returned, and the tumour rose up again, the moment the compression was discontinued. There is a fact in the memoir by M. Louis, which seems to evince, that good effects may sometimes be produced by compression judiciously employed. A woman, brought to the brink of the grave by the symptoms, occasioned by a tumour of the above kind, having rested with her head, for some time, on the same side as the tumour, found the swelling so suddenly reduced, without any ill effects, that she thought herself cured by some miracle. A compression artfully kept up, by means of a piece of tin, fastened to her cap, prevented the protrusion of the tumour again. The pressure, however, not having been always very exact, the symptoms every now and then recurred, while the tumour was in the act of being depressed again, and they afterwards ceased, on the swelling having assumed a suitable position.

The symptoms were, doubtless, occasioned by the irritation, which the tumour suffered, in passing the inequalities around the opening, through which it protruded. The patient lived in this state nine years, having every now and then trances, in one of which, attended with hiccough and vomiting, she perished.

As compression cannot be depended upon, the following safer method may be tried. It consists in exposing the tumour with a knife, which is certainly preferable to caustics, the action of which can never be limited, nor extended, exactly as one wishes. A crucial incision may be made through the scalp covering the tumour, and the flaps dissected up, and reflected, so as to bring all the bony circumference into view. Then with trephines repeatedly applied, or with what would be better, Mr. Hey's saws, all the margin of the bone should be carefully removed.

The tumour, thus disengaged on all sides, may be cut off with a scalpel. After this, some recommend applying to the cut surface an ointment containing the hydrarg. nitrat. rub., an application, which I would not recommend. On the contrary, it seems to me preferable, in order to avoid all occasion for the use of caustic, to remove every part of both layers of the dura mater immediately under the excrescence. By this means, all chance of the regeneration of the tumour will be prevented.

When the tumour is sarcomatous, and its pedicle small and narrow, as sometimes happens, one should not hesitate to cut it off.

This method is preferable to tying the base of such tumours with a ligature, as the latter plan cannot be executed, without dragging, and seriously injuring the dura mater, so as to excite dangerous consequences. The excision is also preferable to caustics, which cause great pain, and very often convulsions. In performing the extirpation, we should remove the whole extent of the tumour, and, if possible, its root, even though it may extend as deeply as the internal layer of the dura mater. This step must not be delayed, for the disease will continue to increase, so as to affect the brain, become incurable, and even mortal. It is to such decision, that we must impute the success, which attended the treatment of the Spaniard Avalos, of whom Marcus Aurelius Severinus makes mention. The above nobleman was afflicted with intolerable head-achs, which no remedy could appease. It was proposed to him to trepan the cranium, an operation, to which he consented. This proceeding brought into view, under the bone, a fungous excrescence, the destruction of which proved a permanent cure of the violent pains, which the disease had occasioned. It is not mentioned in this case, whether the internal layer of the dura mater was healthy, or not; but, there is foundation for believing, that if the extirpation of these tumours be undertaken in time, and bold measures be pursued, as in the instance just cited, success would often be obtained. Indeed, reason would support this opinion; for, when the disease is not extensive, it is necessary to expose a much smaller surface of the dura mater.

M. Louis has described other tumours, which grow from the surface of the dura mater, after this membrane has been denuded, as after the application of the trephine. They only seem to differ from the preceding ones in not existing, before the opening was made in the skull. These cases are not to be confounded with the hernia cerebri. (*See this Article.*) See on the preceding subject, *Mémoire sur les Tumeurs fongueuses de la Dure-Mere, par M. Louis, in Mém. de l'Académie de Chirurgie, Tom.* 5, 4*to.*, *or Tom.* 13, 12*mo. Encyclopédie Méthodique, Partie Chirurgicale, art. Dure-Mere. Richerand's Nosographie Chirurgicale, Tom.* 2, *p.* 284. *Edit.* 2. *Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 497. *Edit.* 1809.

An account of the inflammation of the dura mater will be found in the article, *Head, Injuries of.*

DYSTÆCHIASIS. (from δυς, bad, and στοιχος, order.) An irregular arrangement of the eye-lashes.

DYSURIA, (from δυς, difficulty, and ουρον, the urine.) A difficulty of discharging the urine.

E.

EAR, DISEASES OF.

AN organ, so valuable and necessary to the perfection of our existence, as the ear is, should have all the resources of surgery exerted for the preservation of its integrity, and the removal of the diseases, with which it may be affected. What, indeed, would have been our lot, if nature had been less liberal, and not endued us with the sense of hearing? As M. Leschevin has observed, we should

then have been ill qualified for the receipt of instruction; a principal inlet of divine and human knowledge would have been closed; and there being no reciprocal communication of ideas, our feeble reason could never have approached perfection. Even our life itself being as it were dependent upon all such bodies as surround us, would have been incessantly exposed to dangers. The eyesight serves to render us conscious of objects, which present themselves before us, and, when we judge them to be hurtful, we endeavour to avoid them. But, to say nothing of our inability of looking on all sides at at once, our eyes become of no service to us, whenever we happen to be enveloped in darkness. The hearing is then the only sense, that watches over our safety. It warns us, not only of every thing, which is moving about us, but likewise of noises, which are more or less distant. Such are the inestimable advantages which we derive from this organ. Its importance, when healthy, makes it worthy of the utmost efforts of surgery, when diseased. (See *M. Leschevin's Dissert. in Mémoires sur les Sujets proposés pour le Prix de l'Acad. Royale de Chirurgie, Tom.* 9. *p.* 111, 112. *Edit.* 12*mo.*

1. *Wounds of the External Ear.*

The external ear, which is a sort of instrument calculated for concentrating the rays of sound, may be totally cut off, without deafness being the consequence. For a few days after the loss, the hearing is rather hard; but, the infirmity gradually diminishes, the increased sensibility of the auditory nerve compensates for the imperfection of the organic apparatus, and the acuteness of the sense is entirely restored. (*Richerand, Nosographie Chirurgicale, Tom.* 2, *p.* 122. *Edit.* 2.) However, if we are to credit the statement of other writers, the recovery is far less complete, than M. Richerand represents it to be. Thus Leschevin notices, that they, who have lost the external ear, or have it naturally too flat, or ill shaped, have the hearing less subtile. The defect can only be remedied by an artificial ear, or an ear-trumpet, which receiving a large quantity of the sonorous rays, and directing them towards the meatus auditorius, thus does the office of the external part of the ear. (*Prix de l'Acad. Royale de Chirurgie, Tom.* 9, *p.* 120. *Edit.* 12*mo.*

Wounds are not the only causes, by which the external ear may be lost: its separation is sometimes the consequence of ulceration, and sometimes the effect of the bites of horses and other animals. In some countries, it is a part, that is frequently attacked with inflammation and sloughing, in consequence of having been frozen. Except the external ear be totally separated from the head, the surgeon should not despair of being able to accomplish the reunion of it. This attempt should always be made, however small a connexion the detached part may have with the skin; for, in wounds of this kind, the efforts of surgery have occasionally succeeded beyond all expectation.

Wounds of the external ear, whatever may be their size and shape, do not require a different treatment from that of the generality of other wounds. The reunion of the divided part is the only indication, and it may be in most instances easily fulfilled by means of methodical dressings. Such writers, as have recommended sutures for wounds of the ear, (says Læschevin,) have founded this advice upon the difficulty of applying to the part a bandage, that will keep the edges of the wound exactly together. The cranium, however, affords a firm and equal surface, against which the external ear may be conveniently fixed. Certainly, it is not more easy to secure dressings on the nose than the ear; and, yet, cases are recorded, in which the cartilaginous part of the nose was wounded, and almost entirely separated, and the union was effected without the aid of sutures. (See *Mém. de M. Pibrac sur l'Abus des Sutures, in Mém. de l'Acad. de Chir. Tom.* 3.)

In wounds of the ear, then, we may conclude, that sutures are generally useless and unnecessary. As examples may occur, however, in which the wound may be so irregular and considerable as not to admit of being accurately united, except by this means, it should not be absolutely rejected. An enlightened surgeon will not abandon altogether any curative plans; he only points out their proper utility, and keeps them within the right limits. When sticking plaster, simple dressings, and a bandage, that makes moderate pressure, appear insufficient for keeping the edges of a wound of the ear in due contact, the judicious practitioner will not hesitate to employ sutures.

When a bandage is applied to the external ear, it should only be put on with moderate tightness, since much pressure gives considerable uneasiness, and may induce sloughing of the part. In order to prevent these disagreeable effects, M. Leschevin advises us to fill the space behind the ear with soft wool or cotton, against which the part may be compressed without risk. (*Op. cit. p.* 119.)

In the application of sutures, the ancients have cautioned us to avoid carefully the cartilage, and to sew separately, one after the other, the skin of both sides of the ear. They were fearful, that pricking the cartilage would make it mortify, "*ce qui est souvente-fois arrivé*," says Paré. But, notwithstanding so respectable an

authority, as M. Leschevin has remarked, the moderns make no scruple about sewing cartilages. In wounds of the nose, Verdue expressly directs the skin and cartilage to be pierced at once in applying sutures, and the success of the plan is put out of all doubt by a multitude of facts. The same treatment may also be safely extended to the ear.

Celsus, lib. 8, c. 6, has mentioned fractures of the cartilage of the ear; but, such an accident seems hardly possible, unless the part be previously ossified. Hence, M. Leschevin could never meet with such a case, either in practice, or in the works of surgical writers.

2. *Of the Meatus Auditorius, and its Imperfections.*

This is the passage, which leads from the cavity of the external ear, called the concha, down to the membrane of the tympanum. This tube, which is partly cartilaginous, and partly bony, has an oblique winding direction, so that its whole extent cannot be easily seen. There are circumstances, however, in which it is proper to look as far as possible into the passage. Such is the case, when the surgeon is to extract any foreign body, to remove any excrescence, or to detect any other occasion of deafness. Fabricius Hildanus gives a piece of advice upon this subject, not to be despised; namely, to expose the ear to the rays of the sun, in order to be enabled to see the very bottom of the meatus auditorius externus.

The surgical operations, practised on the meatus auditorius, are confined to opening it, when preternaturally closed, extracting foreign bodies, washing the passage out with injections, and removing excrescences, which may form there.

The case, which we shall next treat of, is the imperforation of the meatus auditorius externus, a defect with which some children are born. When the malformation exists in both ears, it generally renders the subject dumb as well as deaf, for, as he is incapable of imitating sounds, which he does not hear, he cannot of course learn to speak, although the organs of speech may be perfect, and in every respect rightly disposed. In this case, the surgeon has to rectify the error of nature, and, (to use the language of M. Leschevin,) he has to give by a double miracle, hearing and speech to an animated being, who, deprived of these two faculties, can scarcely be regarded in society as one of the human race. How highly must such an operation raise the utility and excellence of surgery in the estimation of the world!

About twelve years ago, I remember a child being shewn to several medical gentlemen in London, as a curiosity: it was entirely destitute of all appearance of external ears, and no vestiges of the meatus auditorii could be seen. The natural situations of these openings were completely covered with the common integuments. Yet, it deserves attention, that the child could hear a great deal, though the sense was certainly dull and imperfect. I remember, that the circumstance of the patient hearing so well as he did, was what excited considerable surprize. I am sorry I do not more particularly recollect, at the present time, the degree, in which this sense was enjoyed, and several other circumstances, such as the child's age, power of speech, &c. The example, however, is interesting, inasmuch as it proves, contrary to the assertions of authors, that even an imperforate condition of both ears may be unattended with complete deafness, provided the internal and more essential parts of these organs are sound and perfectly formed.

When the meatus auditorius externus is merely closed by an external membrane, the nature of the case is evident, and the mode of relief equally easy. But, when the membrane is more deeply situated in the passage, near the tympanum, the diagnosis is attended with more difficulty, and the treatment with greater trouble.

If the preternatural membrane is external, or only a little way within the passage, it is to be divided with a bistoury; the small flaps are to be cut away; a tent, of a suitable size, is to be introduced into the opening; and the wound is to be healed *secundum artem*, care being taken to keep it constantly dilated, until the cicatrization is completed.

When the obstruction is deeply situated, we must first be sure of its existence, which is never ascertained, or even suspected, till after a long while. It is not till after children are past the age, at which they usually begin to talk, that any defect is suspected in the organ of hearing, because until this period, little notice is taken, whether they hear or not. As soon as it is clear, that this sense is deficient, the ears should always be examined with great attention, in order to discover, if possible, the cause of the deafness. Sometimes, the infirmity depends upon a malformation of the internal ear, and the cause does not then admit of detection. The most convenient method of making the examination is to expose the ear, which is about to be examined, to the light of the sun. In this situation, the surgeon will be able to see beyond the middle of the bony part of the meatus, if he places his eye opposite the orifice of the passage, and takes care to efface the curvature of the cartilaginous portion of

the canal, by drawing upward the external ear. If the passage has been carefully cleansed, before the examination, the skin, forming the obstruction may now be seen, unless it be immediately adherent to the tympanum.

When the preternatural septum is not closely united to the tympanum, its destruction should be attempted, and hopes of effecting the object, either suddenly, or gradually, may reasonably be entertained. According to M. Leschevin, the particular situation of the obstruction is the circumstance, by which the surgeon ought to be guided in making a choice of the means for this operation. If the membranous partition is so far from the tympanum, that it can be pierced without danger of wounding the latter part, there can be no hesitation in choosing the plan to be adopted. In the contrary state of things, M. Leschevin is an advocate for the employment of caustic, not only on account of the risk of injuring the tympanum with a cutting instrument, but, also, because, if the puncture were ever so well executed, a tent could not be introduced into it, so as to prevent it from closing again.

In the first case, a very narrow sharp-pointed bistoury should be used: after its blade has been wrapped round with a bit of tape to within a line of the point, it is to be passed perpendicularly down to the preternatural membrane, which is to be cut through its whole diameter. The instrument being then directed first towards one side, then the other, the crucial incision is to be completed. As the flaps, which are small and deeply situated, cannot be removed, the surgeon must be content with keeping them separated by means of a blunt tent. The wound will heal just as favourably as that occasioned in removing the imperforation of the concha, or outer part of the meatus auditorius. (*Prix de l'Acad. de Chir. p.* 124—126, *Tom.* 9.) In the second case, that is to say, when the risk of wounding the tympanum leads us to prefer the employment of caustic, the safest and most commodious way of putting the plan in execution would be that of touching the obstruction, as often as circumstances may require, with the extremity of a bougie armed with the argentum nitratum. In the intervals of the applications, no dressings need be introduced, except a bit of clean soft cotton, for the purpose of absorbing any discharge, which may take place within the passage.

It is manifest, that if the whole, or a considerable part of the meatus auditorius externus were wanting, the foregoing measures would be insufficient. The following observations of M. Leschevin seem to merit attention: "I do not here allude to cases, in which a malformation of the bone exists. I know not, whether there are any examples of such an imperforation; but, it is clear, that it would be absolutely incurable. I speak of a temporal bone perfectly formed in all its parts, and the meatus auditorius of which, instead of being merely lined by a membrane, as in the natural state, is blocked up by the cohesion of the parietes of this membrane throughout a certain extent of the canal; just as the urethra, rectum, or vagina, is sometimes observed to be not simply closed by a membrane, but by a true obliteration of its cavity.

"Such a defect in the ear may be congenital, and it may also arise from a wound, or ulceration, of the whole circumference of the meatus auditorius externus, this canal having become closed by the adhesion of its parietes, on cicatrization taking place.

"Such an imperforation, whether congenital, or accidental, must certainly be more difficult to cure, than the examples treated of above; but, (says M. Leschevin) I do not for this reason believe, that the case ought to be entirely abandoned. Yet, I would not have the cure attempted in all sorts of circumstances. For instance, if the defect only existed in one ear, and the other were sound, I would not undertake the operation, because, as the patient can hear tolerably well on one side, the advantages which he might derive from having the enjoyment of the other ear, would not be adequate to counterbalance the pain and bad symptoms occasioned by such an experiment, the success of which is extremely uncertain. I would not then run the risk of making a perforation, except in a case of complete deafness; and I propose this means only as a dubious one upon the fundamental maxim, so often laid down, that it is preferable to employ a doubtful remedy, than none at all.

"With respect to the mode of executing this operation," says M. Leschevin, "the trocar seems the most eligible instrument. I would employ one, that is very short, and the point of which is bluntish, and only projects out of a cannula as little as possible. This construction would indeed make the instrument less adapted to pierce any thing; but, still, as the parts to be perforated are firm, their division might be accomplished sufficiently well; and the inconvenience of a trivial difficulty in the introduction of the trocar is comparatively much less, than that, which would attend the danger of wounding with a sharper point the membrane of the tympanum. I would plunge the point of the instrument into the place, where the opening of the meatus auditorius externally ought naturally to be, and which would be de-

noted, either by a slight depression, or at all events, by attending to the different parts of the ear, especially, the tragus, which is situated directly over this passage. I would push in the trocar gently, in the direction of the canal formed in the bone, until the point of the instrument felt as if it had reached a vacant space. Then, withdrawing the trocar, and leaving the cannula, I would try, whether the patient could hear. I would then introduce into the cavity of the cannula itself a small, rather firm tent, of the length of the passage, or rather a small bougie. By means of a probe, I would push it to the end of the cannula, which I would now take out, observing to press upon the tent, which is to be left in. The rest of the treatment consists in keeping the canal pervious, making it suppurate, and healing it with common applications. One essential caution, however, would be that of keeping the part dilated long after it had healed: otherwise, it might close again, and a repetition of the operation become necessary. This happened to Heister, as he himself apprises us, and it occurred to Roonhuysen in treating imperforations of the vagina.

"If the cohesion of the parietes of the meatus auditorius externus were to extend to the tympanum inclusively, the operation would be fruitless; but, as it is impossible to ascertain this circumstance, before the attempt is made, the surgeon would incur no disgrace by relinquishing the operation, and giving up the treatment of an incurable disease. If, then, after the trocar were introduced to about the depth of the tympanum, the situation of which must be judged of by our anatomical knowledge, no cavity were met with, the operation should be abandoned; and, if in these circumstances, any one were to impute the want of success to the inefficacy of surgery, or the unskilfulness of the surgeon, he would act very unfairly.

"It is also plain, that such an operation could only cure a congenital deafness, inasmuch as the infirmity might depend solely upon the imperforation; for, if there should exist, at the same time, in the internal ear, any malformation, which might destroy the power of the organ, the remedying of the external defect would be quite useless." (*Leschevin, in Prix de l'Acad. de Chirurgie, Tom. 9, p.* 127—132.)

We find, that this author entertains a great dread of wounding the tympanum, and, certainly he is right in generally insisting upon the prudence of avoiding such an accident. It will appear, however, in the sequel of this article, that puncturing the tympanum has, under certain circumstances, been successfully practised, as a mode of remedying deafness: so far is it from being particularly dangerous, or destructive of the functions of the ear.

3. *Unusual smallness of the Meatus Auditorius Externus.*

Imperforation is not the only affection of the meatus auditorius, with which nature sometimes afflicts us, before our birth. This passage is occasionally too narrow, and, hence, there is not room enough for the entrance of a due quantity of the sonorous rays, and the sense is of course unavoidably feeble. Leschevin mentions, that M. de la Metrie had seen this canal so narrow in a young person, that it could hardly admit a probe. What has been observed concerning the imperforation is also applicable to this case. If it depends upon malformation of the bone, it is manifestly incurable; but, if it is owing to a thickening of the soft parts, within the meatus, hopes may be indulged of doing good by gradually dilating the passage by tents, which should be increased in size from time to time, and, lastly, making the patient wear for a considerable time, a tube, adapted to the part in shape. (*Leschevin, in Prix de l'Acad. de Chirurgie, Tom. 9, p.* 132.)

4. *Faulty shape of the Meatus Auditorius Externus.*

Anatomy informs us, that this passage is naturally oblique, and somewhat winding; and natural philosophy teaches us the necessity of such obliquity, in demonstrating, that it multiplies the reflections of the sonorous rays, and thereby strengthens the sense. This theory, says M. Leschevin, is confirmed by experience; for, there are persons, in whom the meatus auditorius is almost straight, and they are found to be hard of hearing. If there is any means of correcting this defect, it must be that of substituting, for the natural curvature of the passage, a curved and conical tube, which must be placed at the outside of the organ, just like a hearing trumpet. The acoustic instrument, invented by Deckers, which is much more convenient, might also prove useful.—(*Op. cit. p.* 133.)

5. *Extraneous Substances, Insects, &c. in the Meatus Auditorius Externus.*

Foreign bodies met with in this situation are inert substances, which have been introduced by some external force; insects, which have insinuated themselves into the passage; or the cerumen itself, hardened in such a degree, as to obstruct the transmission of the sonorous undulations. Worms, which make their ap-

pearance in the meatus auditorius, are always produced subsequently to some ulcerations in the passage, or in the interior of the tympanum, and, very often, such insects are quite unsuspected causes of particular symptoms. In the cases of surgery, published in 1778 at Stockholm, by Olaus Acrel, there is an instance confirming the statement just offered. It is the case of a woman, who, having been long afflicted with a hardness of hearing, was suddenly seized with very violent convulsions, without any apparent cause, and soon afterwards complained of an acute pain in the ear. This affection was followed by a recurrence of convulsions, which were more vehement, than before. A small tent of fine linen, moistened with a mixture of oil and laudanum, was introduced into the meatus auditorius, and, on removing it the next day, several small round worms were observed upon it, and, from that period, all the symptoms disappeared. To this case, we shall add another from Morgagni. A young woman consulted Valsalva, and told him, that when she was a girl, a worm had been discharged from her left ear; that another one, about six months ago, had also been discharged, very much like a small silk-worm in shape. This event took place after some very acute pain in the same ear, the forehead, and temples. She added, that since this, she had been tormented with the same pains, at different intervals, and, so severely, that she often swooned away for two hours together. On recovering from this state, a small worm was discharged, of the same shape as, but much smaller than, the preceding one, and that she was now afflicted with deafness and insensibility on the same side. After hearing this relation, Valsalva no longer entertained any doubt of the membrane of the tympanum being ulcerated. He proposed the employment of an injection, in order to destroy the nest of worms, which he presumed to exist. For this purpose, distilled water of St. John's wort, in which mercury had been agitated, was used. Morgagni adds, that nothing appears to him more proper, in such cases, to prevent a recurrence of such worms, than to avoid going to sleep, particularly in autumn and summer, without taking care to stop up the affected ear. If this be not done, flies attracted by the suppuration, enter the meatus auditorius, and, while the patient is inconscious, deposit their eggs in the ear. Acrel, in speaking of worms, generated in the meatus auditorius, observes, that there is no better remedy for them, than the decoction of ledum palustre, injected into the ear, several times a day. However, as it is not always possible to procure this plant, we shall recommend in such cases, in preference to all other remedies, a slight infusion of tobacco in oil of almonds, a few drops of which are to be introduced into the ear, and to be retained there by means of a little bit of cotton. This application, which is not injurious to the lining of the passage, is fatal to insects, and, especially, to worms, as various experiments have convinced naturalists. This method may also succeed in cases, in which caterpillars, ants, and other insects, have insinuated themselves into the meatus auditorius; but, it is always better, first to endeavour to extract them. A piece of lint, smeared with honey, often suffices for this purpose, and when they cannot be extracted by this simple means, they may be taken out with a very small pair of forceps, however little of them may be visible. The latter method serves also for the extraction of cherry-stones, peas, or other seeds, which have been introduced into the meatus auditorius. If such substances should make too much resistance, forceps with stronger blades for breaking the extraneous bodies must be employed, and then the fragments are to be extracted piecemeal. But, in these cases, it is always proper to inject into the ear some oil of almonds, before attempting to extract the extraneous bodies. The presence of these substances often occasions the most extraordinary symptoms, as we may see in the fourth observation of Fabricius Hildanus. Cent. 13.

After four surgeons, who had been successively consulted, had in vain exerted all their industry to extract a bit of glass from the left ear of a young girl, the patient found herself abandoned to the most excruciating pain, which soon extended to all the side of the head, and which, after a considerable time, was followed by a paralysis of the left side, a dry cough, suppression of the menses, epileptic convulsions, and at length an atrophy of the left arm. Hildanus cured her by extracting the piece of glass, which had remained eight years in her ear, and had been the cause of all this disorder. Athough the extraction must have been very difficult, it does not appear that Hildanus found it necessary to practise an incision behind the ear, as some authors have advised, and amongst them, Duverney, who has quoted the foregoing case. We must agree with Leschevin, that such an incision does not seem likely to facilitate the object very materially; for, it must be on the outside of the extraneous substance, which is the bony part of the canal. It is true, indeed, that the incision enables us, in some measure, to avoid the obliquity of the passage, as Duverney has observed; but, it is not such obliquity of the carti-

laginous portion of the canal, that can be a great impediment; for, as it is flexible, it may easily be made straight, by drawing upward the external ear. Hence, Fabricius ab Aquapendente rejected this operation, which was first proposed by Paulus Ægineta; and it is justly disapproved of by Leschevin (*Prix de l'Acad. de Chir. Tom.* 9, *p.* 147, *edit.* 12*mo.*)

6. *Meatus Auditorius obstructed with thickened, or hardened Cerumen.*

The cerumen, which is secreted into the meatus auditorius by the sebaceous glands of the part, frequently accumulates there in very large quantities, and becoming harder and harder, at length acquires so great a degree of solidity, as entirely to deprive the patient of the power of hearing. Galen has remarked; *è numero eorum quæ meatum obstruunt, sordes esse quæ in auribus colligi solent.* This species of deafness is one of those kinds, which are the most easy of cure, as is confirmed by observers, especially Duverney. Frequent injections, either with simple olive oil, or oil of almonds, have always been recommended in such cases. The injection is to be retained by a piece of cotton, and, when there is reason to believe that the matter is sufficiently softened, an attempt may be made to extract it by means of a small scoop-like instrument. Whatever success this plan may have obtained, various experiments were made at Chester, in 1769, by Haygarth, from which it appears, that warm water is still preferable. This dissolves the mucous matter, which connects together the truly ceruminous particles, and which is the cause of their tenacity; other applications only succeeding by reason of the water which they contain.

"The symptoms (says Mr. Saunders) which are attached to the inspissation of the cerumen are pretty well known. The patient, besides his inability to hear, complains of noises, particularly a clash or confused sound in mastication, and of heavy sounds, like the ponderous strokes of a hammer.

"The practitioner is led by the relation of such symptoms to suspect the existence of wax; but he may reduce it to a certainty by examination.

"Any means capable of removing the inspissated wax may be adopted; but syringing the meatus with warm water is the most speedy and effectual, and the only means necessary. As the organ is sound, the patient is instantaneously restored." (*Anatomy of the human Ear, with a Treatise on its Diseases, by J. C. Saunders,* 1806. *p.* 27, 28.)

7. *Discharges from the Meatus Auditorius.*

Purulent discharges from the ear, either come from the meatus auditorius externus itself, or they originate from suppuration in the tympanum, in consequence of blows on the head, abscesses after malignant fevers, the small-pox, or the venereal disease. In such cases, the little bones of the ear are detached, and escape externally, and complete deafness is most frequently the consequence. However, in a few instances, total deafness does not always follow even this kind of mischief, as I myself have witnessed in one or two instances. There is greater hope, when the disorder is confined to the meatus; as judicious treatment may now avert the most serious consequences. In Acrel's surgical cases, there is a case, relative to the circumstance, of which we are speaking. Suppuration took place in the meatus auditorius externus, in consequence of acute rheumatism, which was followed by vertigo, restlessness, and a violent head-ach. The matter discharged was yellowish, of an aqueous consistence, and acid smell. The meatus auditorius was filled with a spongy flesh. On introducing a probe, our author felt a piece of loose rough bone, which he immediately took hold of with a pair of forceps, and extracted. From the time, when this was accomplished, the discharge diminished; with the aid of proper treatment, the patient became perfectly well.

The meatus auditorius, like all other parts of the body, is subject to inflammation. This is frequently produced by exposure to cold. It is hardly necessary to say, that topical bleeding and antiphlogistic means in general are indicated. The meatus auditorius should also be protected from the cold air, particularly in the winter season, by means of a piece of cotton.

Mr. Saunders observes, "When the means employed to reduce the inflammation have not succeeded, and matter has formed, it is generally evacuated, as far as I have observed, between the auricle and mastoid process, or into the meatus. If it has been evacuated into the meatus, the opening is most commonly small, and the spongy granulations, squeezed through a small aperture, assume the appearance of a polypus. Sometimes the small aperture, by which the matter is evacuated, is in this manner even closed, and the patient suffers the inconvenience of frequent returns of pain from the retention of the discharge. When the parts have fallen into this state, it will be expedient to hasten the cure by making an incision into the sinus, between the auricle and mastoid process.

"It occasionally happens, that the bone itself dies, in consequence of the sinus being neglected, or the original extent of the suppuration. The exfoliating parts are the meatus externus of the os temporis or the external lamina of the mastoid process." (*Page* 24, 25.)

8. *Excrescences in the Meatus Auditorius.*

Though the membrane, lining the meatus auditorius, is very delicate, it is not the less liable to become thickened, and to form polypous excrescences. This case, however, is not common. As such tumours are ordinarily firmer in their texture, than polypi of the nose, they are sometimes not so easily extracted with forceps. When they are situated near the external orifice, and admit of being taken hold of with a small pair of forceps, or a hook, they may easily be cut away, when drawn outward, and this without any reason for fearing hemorrhage. This, indeed, is usually very trivial. When the tumours are more deeply situated, Mr. B. Bell recommends giving the preference to the use of a ligature. Here the same plan may be pursued as will be explained in the article *Polypus*. But it sometimes happens, that the excrescences cannot be removed in this manner; as, instead of being adherent by a narrow neck, they have a broad base, which occupies a considerable extent of the passage. In such cases, some have been so absurd as to advise the use of escharotics; but, as these applications cannot be used without risk of injuring the membrane of the tympanum, it is better to have recourse to some other method. (*Encyclopédie Méthodique; Partie Chirurgicale. Art. Auditif conduit.*) Mr. B. Bell recommends dilating the passage with bougies; but it is obvious that the pressure of such instruments would also be very likely to irritate and inflame the membrane of the tympanum.

9. *Herpes of the Meatus Auditorius.*

An herpetic ulcerous eruption sometimes affects the meatus auditorius and auricle, producing considerable thickening of the skin, and so great an obstruction of the passage, that a good deal of deafness is the consequence. Mr. Saunders remarks, that, in this case, "the ichor, which exudes from the pores of the ulcerated surface, inspissates in the meatus, and not only obstructs the entrance of sound, but is accompanied with a great degree of fœtor. This disease is not unfrequent. I have never seen it resist the effect of alterative medicines," the use of injections containing the hydrargyrus muriatus, and the application of the unguentum hydrargyri nitrati, Mr. Saunders exhibited calomel as the alterative, and, in one instance, employed a solution of the argentum nitratum, as an injection. (*Page* 25, 26.)

10. *Affections of the Tympanum.*

This is sometimes effected with a puriform ichorous discharge, attended with a loss of hearing, proportionate to the degree of disorganization which this part of the ear has sustained. In general, on blowing the nose, air is expelled at the meatus auditorius externus; and, when this is the case, it is evident, that the discharge is connected with an injury, or destruction of the membrana tympani. However, when the Eustachian tube is obstructed with mucus, or matter, or when it is rendered impervious, and permanently closed by inflammation, the membrana tympani may not be perfect, and, yet, it is clear, no air can in this state be forced out of the external air in the above manner. An examination with a blunt probe, or with the eye, while the rays of the sun fall into the passage, should therefore not be omitted. If the membrane have any aperture in it, the probe will pass into the cavity of the tympanum, and the surgeon feel that his instrument is in contact with the ossicula.

In this manner the affection may be discriminated from an herpetic ulceration of the meatus auditorius externus. The causes are various: In scarlatina maligna, the membrana tympani occasionally inflames, and sloughs; all the ossicula are discharged, and, if the patient live, he continues quite deaf. An ear-ach, in other words, acute inflammation of the tympanum, is the most common occasion of suppuration in this cavity, in which, and the cells of the mastoid process, a good deal of pus collects. At length, the membrana tympani ulcerates, and a large quantity of matter is discharged; but, as the secretion of pus still goes on, the discharge continues to ooze out of the external ear.

Instead of stimulating applications, inflammation of the tympanum demands the rigorous employment of antiphlogistic means. Unfortunately, it is a too common practice, in this case, to have recourse to acrid spirituous remedies. Above all things the repeated application of leeches to the skin behind the external ear, and over the mastoid process, should never be neglected. As soon as the inflammation ceases, the degree of deafness, occasioned by it, will also disappear. This, however, does not always happen.

When an abscess is situated in the cavity of the tympanum, Mr. Saunders seems to think, that the membrana tym-

pani should not be allowed to burst by ulceration, but be opened by a small puncture. (*Page* 31.)

Sometimes the disease, of which we are treating, is more insidious in its attack: slight paroxysms of pain occur, and are relieved by slight discharges. The case goes on in this way, until, at last, a continual discharge of matter from the ear takes place. The disorder is destructive in its tendency to the faculty of hearing, and it rarely stops, until it has so much disorganized the tympanum and its contents, as to occasion total deafness. Hence Mr. Saunders very properly defends the propriety of making attempts to arrest its progress,—attempts which are free from danger; and he censures the foolish fear of interfering with the complaint, founded on the apprehension, that bad constitutional effects may originate from stopping the discharge.

If the case be neglected, the tympanum is very likely to become carious; before which change, the disease, says Mr. Saunders, is most commonly curable.

Mr. Saunders divides the complaint into three stages; 1. A simple puriform discharge. 2. A puriform discharge complicated with funguses and polypi. 3. A puriform discharge with caries of the tympanum. As the disease is a local one, direct applications to the parts affected are chiefly entitled to confidence. Blisters and setons may be advantageously employed in aid of topical applications. Mr. Saunders's practice, in these cases, consists in administering laxative medicines and fomenting the ear, while inflammatory symptoms last, and afterwards injecting a solution of zincum vitriolatum, or cerussa acetata.

In the second stage, when there are funguses, he removes or destroys them with forceps, afterwards touches their roots with the argentum nitratum, or injects a solution of alum, zincum vitriolatum, or argentum nitratum.

11. *Obstruction of the Eustachian Tube.*

This is often a cause of a considerable degree of deafness, because it is necessary for perfect hearing, that air should be conveyed from the mouth through this passage into the cavity of the tympanum, which now can no longer happen.

A degree of deafness generally attends a severe cold, which is accounted for by the Eustachian tube being obstructed with thickened mucus. Mr. Saunders tells us, that the obstruction most frequently arises from syphilitic ulcers in the throat, or sloughing in the cynanche maligna. The deafness comes on when such sores are healed, that is, when the obstruction is complete. The descent of a nasal polypus into the pharynx, and enlarged tonsils have also been known to close the tube. (*Page* 42.)

When the Eustachian tube is obstructed, the patient cannot feel the membrana tympani crackle, as it were, in his ear, on blowing forcibly with his nose and mouth stopped. Previous ulceration, or disease, of the throat, will sometimes aid in facilitating the diagnosis.

When the Eustachian tube is obstructed with mucus, it has been proposed to employ injections, which are to be thrown by means of a syringe and catheter, into the guttural orifice of that canal. This operation, however, is alledged to be always attended with trouble, and, when the os spongiosum inferius happens to be situated near the floor of the orbit, the introduction of any instrument like a female catheter, would be impracticable. (*Richerand Nosographie Chirurgicale, Tom. 2, p. 131, edit. 2.*)

Mr. A. Cooper had noticed, that hearing was only impaired, not lost, when suppurations in the tympanum, had injured, and even destroyed the membrana tympani, and that the degree of deafness by no means equalled what resulted from an obstruction of the Eustachian tube. Hence, when the tube was permanently obliterated, he conceived, that a small puncture of the membrana tympani might be the means of enabling the patient to hear. Mr. A. Cooper practised the plan with success, and others have imitated him with the same result.

The operation consists in introducing an instrument, resembling a hydrocele trocar, but curved, into the meatus auditorius externus, and pushing it through the anterior and inferior part of the membrana tympani; a place rendered most eligible, on account of the situation of the chorda tympani and manubrium of the malleus, parts, which should be left uninjured. The instrument must not be introduced far, lest it should wound the vascular lining of the tympanum, and cause a temporary continuance of the deafness, by an effusion of blood. When the puncture is made, in proper cases, and in a judicious manner, hearing is immediately restored. A small hole in the membrana tympani now conveys the air into the cavity of the tympanum, answering the same purpose as the Eustachian tube.

The surgeon will be able to operate with more ease, if he take care to lessen the curvature of the meatus auditorius by drawing upward the external ear.

There is some chance of a relapse in consequence of the opening closing up. This consideration has led Richerand to propose making the aperture with caustic, so as to destroy a part of the membrane, (*Nosographie Chirurgicale, Tom. 2,*

p. 132, *edit.* 2.) The suggestion is not, however, likely to be adopted, on account of the inconveniences of applying caustic within the ear. Mr. Saunders is an advocate for making the opening large. This gentleman relates, that he instantaneously restored hearing in one case, in which the patient had been deaf thirty years, in consequence of a loss of part of his palate by syphilis, (*Page* 45.) Mr. A. Cooper's cases are in the *Philosophical Transactions for* 1802.

Puncturing the membrana tympani has been attended with some degree of success in France, as well as this country. It is not to be dissembled, however, that there are numerous failures. We are informed, that Professor Dubois has done the operation in four instances, without success. (*Richerand Nosographie Chirurgicale, Tom.* 2. *p.* 132.)

In most cases, the patients, who have been benefited, are said to have experienced pain just after the trocar was withdrawn. The organ, in consequence of not being accustomed to sound, had become so extremely sensible, that it could not bear the gentlest impression of the sonorous vibrations, and the patient's first request, after the perforation was made, was that they, who were near him, might speak softly. This excessive tenderness of the sense gradually subsides.

12. *Diseases of the Labyrinth.*.

No doubt deafness (and that kind of it which so frequently foils the most skilful men) arises from an insensible state of the portio mollis of the auditory nerve, or of the surfaces, on which its filaments are spread. This affection is analogous to the amaurosis, or gutta serena, in which, though every part of the eye may seem to possess its natural structure, sight is lost, because the rays of light only strike against a paralytic, or insensible retina. Mr. Saunders dissected the ears of two deaf patients, with the greatest care, but, could not discover the least deviation from the natural structure. Mr. Cline, however, found the labyrinth of a person born deaf filled with a caseous substance, in lieu of the natural limpid fluid, found in this situation, and the supposed use of which is to transmit the vibration of sound.

Mr. Saunders remarks, that all the diseases of the internal ear may be denominated nervous deafness; the term, in this sense, embracing every disease, the seat of which is in the nerve, or parts containing the nerve. Nervous deafness is attended with various complaints in different cases, noises in the head of sundry kinds, the murmuring of water, the hissing of a boiling kettle, rustling of leaves, blowing of wind, &c. Other patients speak of a beating noise, corresponding with the pulse, and increased by bodily exertion, in the same degree as the action of the heart. *Saunders*, *p.* 47.

According to this author, there is a syphilitic species of nervous deafness, attended with a sensation of some of the above peculiar noises: he relates a case, in which the hearing was completely restored, in five weeks, by a mercurial course.

Mr. Saunders has relieved several cases of nervous deafness by confining patients to low diet, giving them calomel freely, repeated doses of natron vitriolatum, or magnesia vitriolata, sometimes twice, sometimes thrice, a week, or according to circumstances, and applying blisters behind the ears at intervals of a week. This plan is to be persevered in.

Were I to offer an opinion, on this subject, I should certainly say, that the analogy, between the deafness arising from paralysis of the nerve, and amaurosis, is so great, that the very same treatment, which has been found efficacious in the latter cases, promises to be of most avail in the former. (See *Amaurosis.*) The reader may consult *Duverney sur l'Organe de l'Ouie; Mémoire sur la Théorie des Maladies de l'Oreille, et sur les moyens que la Chirurgie peut employer pour leur curation, in prix de l'Acad. de Chirurgie, Tom.* 9. *p.* 111, *&c. edit.* 12*mo. Richerand's Nosographie Chirurgicale, Tom.* 2, *p.* 122, *&c. edit.* 2. *A. Cooper, in the Philosophical Transactions for* 1802; *Saunders on the Anatomy and Diseases of the Ear*, 1806.

ECBRA'SMATA. Painful, inflammatory pustules on the surface of the body.

ECBYRSO'MATA. Protuberances of the bones at the joints.

ECCHY'MATA. See *Ecbrasmata.*

ECCHYMO'MA ECCHYMOSIS. (from ἐκχυω, to pour out.) This is a superficial, soft swelling, which makes the skin livid or blue, and is produced by blood extravasated in the cellular substance.

The causes of an ecchymosis are falls, blows, sprains, &c. which occasion a rupture of the small vessels on the surface of the body, and a consequent effusion of blood, even without any external breach of continuity. Ecchymosis is one of the symptoms of a contusion. (See *Contusion.*) A considerable ecchymosis may originate from a very slight bruise, when one of the ruptured vessels is capable of pouring out a large quantity of blood into the interstices of the cellular substance. Ecchymosis does not, in general, make its appearance till several hours after the operation of its cause; at least, it is not till after this time that the black, blue, and livid colour of the skin is most conspicuous. A black eye, which is only an

ecchymosis, is always most disfigured six or eight hours after its occurrence.

In the article *Bleeding*, we have noticed how an ecchymosis may arise from the blood getting out of the vein into the adjacent cellular substance.

Common cases of ecchymosis are generally easily cured, by applying discutient lotions, and administering one or two doses of any mild purgative salt. The best topical applications, are vinegar, the lotio salis ammoniaci, spirit, vin. camph. and aq. ammon. acet.

The object is to avert inflammation, and to promote the absorption of the extravasated fluid.

I have seen such success attend the practice of dispersing collections of extravasated blood, by means of absorption, that the plan of evacuating it by an incision, seems to me to be hardly ever proper in cases of ecchymosis. When an opening is made into such tumours, and air is admitted, the portion of blood which cannot be pressed out, soon putrefies, and extensive inflammation and suppuration, are the too frequent consequences.

ECCHYMO'MA ARTERIOSUM. The false aneurism. See *Aneurism*.

ECCLY'SIS. A dislocation.

E'CCOPE. The cutting away of any part.

ECCOPE'US. The ancient raspatory used in trepanning.

EC'DORA. An excoriation of the urethra.

ECHINOPHTHA'LMIA. (from εχινος, a hedge-hog, and οφθαλμια, an inflammation of the eye.) An inflammation of the eyelids, attended with a projection of the eyelashes, which stand out, like the quills of a hedge-hog.

ECPEPIES'MENOS. Ulcers with high protuberant edges. A depressed fracture of the skull.

ECPIESMA, ECPIESMOS. A morbid protrusion of the eye.

ECPLEROMA. Hippocrates applies this term to hard balls, or substances, which were put in the armpit, when a dislocated shoulder was about to be reduced by the heel.

ECPYE'MA. (from εκ and πυον, *pus*.) Suppuration; an abscess.

EC'PYSIS. An excrescence.

ECRE'XIS. A rupture, or laceration of the uterus.

ECROUELLES. The French name of the king's evil, or scrophula.

ECSARCO'MA. (from εκ and σαρξ, *flesh*.) A fleshy excrescence.

ECTHLI'MMA, ECTHLI'PSIS. Ulceration caused by pressure on the skin.

ECTILLO'TICA. Medicines, which destroy corns, or tubercles, or which remove superfluous hair.

ECTOPOCYSTICA ISCHURIA. A retention of urine from a hernia of the bladder.

ECTRIMMA. An ulceration of the skin over the os sacrum, from lying long in one posture.

ECTROPIUM. (from εκτρεπω, *to divert*.) A turning out, or an eversion of the eyelids.

Just as excessive relaxation of the skin of the eyelids, and a morbid contraction of their lining, near their edges, in consequence of ulcerations and cicatrices, occasion a faulty inclination of the tarsus and eyelashes against the eye; so, sometimes, an elongation and swelling of the membranous lining of the eyelids, or too great a contraction and shortening of the skin of the eyelid itself, or neighbouring parts, produce an opposite disorder to *trichiasis*, viz. an eversion of the eyelids, termed *ectropium*.

Of course, in respect to causes, there are two species of this disease; one, produced by an unnatural swelling of the lining of the eyelids, which not only pushes their edges from the eye-ball, but also presses them so forcibly, that they become everted; the other, arising from a contraction of the skin covering the eyelid, or of that in the vicinity, by which means the edge of the eyelid is first removed for some distance from the eye, and afterwards turned completely outward, together with the whole of the affected eyelid.

The morbid swelling of the lining of the eyelids, which causes the first species of ectropium (putting out of present consideration a similar affection incidental to old age), arises mostly from a congenital laxity of this membrane, afterwards increased by obstinate chronic ophthalmies, particularly of a scrophulous nature, in relaxed, unhealthy subjects; or else the disease originates from the small-pox affecting the eyes.

While the disease is confined to the lower eyelid, as it most commonly is, the lining of this part may be observed rising in the form of a semilunar fold, of a pale red colour, like the fungous granulations of wounds, and intervening between the eye and eyelid, which latter it in some measure everts. When the swelling is afterwards occasioned by the lining of both the eyelids, the disease assumes an annular shape, in the centre of which the eye-ball seems sunk, while the circumference of the ring presses, and everts the edges of the two eyelids so as to cause both great uneasiness and deformity. In each of the above cases, on pressing the skin of the eyelids with the point of the finger, it becomes manifest, that they are very capable of being elongated, and would readily yield, so as entirely to cover the eye-ball, were they not prevented by the intervening swelling of their membranous lining.

Besides the very considerable deformity, which the disease produces, it occasions a continual discharge of tears over the cheek, and, what is worse, a dryness of the eye-ball, frequent exasperated attacks of chronic ophthalmy, incapacity to bear the light, and, lastly, opacity and ulceration of the cornea.

The second species of ectropium, or that arising from a contraction of the integuments of the eyelids, or neighbouring parts, is not unfrequently a consequence of puckered scars, produced by the confluent small-pox; deep burns; or the excision of cancerous, or encysted tumours, without saving a sufficient quantity of skin; or, lastly, the disorder is the effect of malignant carbuncles, or any kind of wound attended with much loss of substance. Each of these causes is quite enough to bring on such a contraction of the skin of the eyelids, as to draw these parts towards the arches of the orbits, so as to remove them from the eye-ball, and turn their edges outward. No sooner has this circumstance happened, than it is often followed by another one equally unpleasant, namely, a swelling of the internal membrane of the affected eye-lids, which afterwards has a great share in completing the eversion. The lining of the eye-lids, though trivially everted, being continually exposed to the air, and irritation of extraneous substances, soon swells, and rises up, like a fungus. One side of this fungus-like tumour covers a part of the eye-ball; the other pushes the eye-lid so considerably outward, that its edge is not unfrequently in contact with the margin of the orbit. The complaints, induced by this second species of ectropium, are the same as those brought on by the first; it being noticed, however, that in both cases, whenever the disease is very inveterate, the fungous swelling of the inside of the eyelids, becomes hard, coriaceous, and, as it were, callous.

Although in both species of ectropium, the lining of the eye-lids seems equally swollen, yet the surgeon can easily distinguish to which of the two species the disease belongs. For, in the first, the skin of the eye-lids, and adjoining parts, is not deformed with scars, and by pressing the everted eyelid with the point of the finger, the part would with ease cover the eye, were it not for the intervening fungous swelling. But, in the second species of ectropium, besides the obvious cicatrix and contraction of the skin of the eyelids, or adjacent parts, when an effort is made to cover the eye with the everted eyelid, by pressing upon the latter part with the point of the finger, it does not give way, so as completely to cover the globe, or only yields, as it ought to do, for a certain extent; or it does not move in the least from its unnatural position, by reason of the integuments of the eyelids having been so extensively destroyed, that their margin has become adherent to the arch of the orbit.

From a comparison of the two species of ectropium, it clearly appears, that the cure of this disease cannot be accomplished with equal perfection in both its forms, and that the second species is even in some cases, absolutely incurable. For, as in the first species of ectropium, the disease only depends upon a morbid intumescence of the internal membrane of the eyelids, and the treatment merely consists in removing the redundant part, art possesses many efficacious means of accomplishing what is desired. But, in the second species of ectropium, the chief cause of which arises from the loss of a portion of the skin of the eyelids, or adjacent parts, which loss no known artifice can restore, surgery is not capable of effecting a perfect cure of the malady. The treatment is confined to remedying, as much as possible, such complaints as result from this kind of eversion, and this can be done in a more or less satisfactory manner, according as the loss of skin on the eyelid is little, or great. Cases, in which so much skin is deficient, that the edge of the eyelid is adherent to the margin of the orbit, are to be abandoned as incurable. *Si nimium palpebræ deest*, says Celsus, *nulla id restituere curatio potest*; (*lib. 7. cap. 7.*) Hence, in treating the second species of ectropium, the degree of success attending the cure, may always be estimated, by remarking to what point the eyelid admits of being replaced, on being gently pushed, with the end of the finger, towards the globe of the eye, both before and after the employment of such means as are calculated to effect an elongation of the skin of the eyelid; for, it is to this point, and no further, that art can reduce the everted part, and permanently keep it so replaced. With respect to the treatment of the first species of ectropium; when the disease is recent, the fungous swelling of the lining of the eyelid not considerable, and, consequently, the edge of the eyelid not much turned out, and in young subjects (for in old ones the eyelids are so flaccid, that the disease is irremediable) it may be cured by destroying the fungous surface of the internal membrane of the eyelid, with the argentum nitratum, which is to be done as follows:—The surgeon must evert the whole of the affected eyelid with his left hand, and with his right wipe it dry with a piece of rag. Then he is to rub the caustic forcibly over the whole surface of the fungous swelling, so as to form an eschar. And, that the patient may suffer as little as possible, an assistant is instantly to apply a little oil to the burnt

part, immediately the caustic is removed, by which means the argentum nitratum will be kept from dissolving in the tears, and spreading over the eye. Should, however, any part of the caustic be dissolved, and give the patient pain, the surgeon, or attendants, must immediately wash the irritating substance away, by repeatedly bathing the eye with new milk. The cauterization is to be repeated for several days in succession, until the argentum nitratum has produced a sufficient destruction of the internal membrane of the eyelid, and of its fungous surface, particularly near the tarsus. Afterwards, bathing the eye with plain water, or barley-water, and mel. rosæ, will prove sufficient for healing the sore on the inside of the eyelid. The result of such treatment will be, that, in proportion as the wound within the eyelid heals, the eversion will gradually diminish, and the edge of the eyelid at last return to its natural position.

This plan of cure can only be successfully put in practice, in cases in which the ectropium is slight and recent. To remedy the considerable and inveterate form of the first species of the disease, in an expeditious and effectual way, the quickest and safest plan is to cut away the whole of the fungous swelling, closely to the muscular substance, on the inside of the eyelid.

The patient being therefore seated, with his head a little inclined backward, the surgeon, with the index and middle finger of his left hand, is firmly to keep the eyelid everted, and holding a small pair of curved scissars, with convex edges, in his right, he is completely to cut off the whole fungosity of the internal membrane of the eyelid, as near as possible to its base. The same operation is then to be repeated on the other eyelid, should that be affected with the same disorder. If the excrescence should be of such a shape, that it cannot be exactly included within the scissars, it must be raised as much as possible, with forceps, or a double-pointed hook, and dissected off at its base, by means of a small bistoury with a convex edge. The bleeding, which seems, at the beginning of the operation, as if it would be copious, stops of itself, or as soon as the eye is bathed with cold water. The surgeon is then to apply the dressings, which are to consist of two small compresses, one put on the upper, the other on the lower arch of the orbit, and over these the uniting bandage, in the form of the monoculus, or so applied as to compress and replace the edges of the everted eyelids, in order to make them cover the eye. On the first removal of the dressings, which should take place about twenty-four or thirty hours after the operation, the surgeon will find the whole, or almost the whole, of the eyelid, in its natural position. The treatment should afterwards consist in washing the ulcer on the inside of the eyelid with simple water, twice a day, or else with aqua malvæ, or barley-water, and mel. rosæ, until it is completely well. If, towards the end of the cure, the wound should assume a fungous appearance, or the edge of the eyelid seem to be too distant from the eyeball, the wound on the inside of the eyelid must be rubbed several times with the argentum nitratum, for the purpose of destroying a little more of the membranous lining, so that, when the cicatrization follows, a greater contraction of it may take place, and the edge of the eyelid be drawn still nearer the eye. However, proper steps must also be pursued, in order to resist the principal cause on which the ectropium depends, particularly, chronic ophthalmy, the relaxed and varicous state of the conjunctiva, &c. (See *Ophthalmy*.)

In the second species of ectropium, or that produced by an accidental contraction of the skin of the eyelids, or neighbouring parts, the curative indication does in no respect differ from what it is in the foregoing instance. If a contraction of the integuments has proved capable of everting the eyelid, the excision of a piece of the internal membrane of the part, and the cicatrix which will follow, must also be capable, for the same reason, of bringing back the eyelid into its natural position. But, since nothing can restore the lost skin, the shortened state of the whole eyelid, in whatever degree it exists, must always continue, even after any operation the most skilfully executed. Hence, the treatment of the second species of ectropium will never succeed so perfectly as that of the first, and the replaced eyelid will always remain shorter, than natural, in proportion to the quantity of integuments lost. It is true, that, in many cases, the eversion seems greater than it actually is, in regard to the small quantity of skin lost or destroyed; for, when the disease has once begun, though the contraction of the skin may be trivial, in consequence of the little quantity of it deficient, still the swelling of the lining of the eyelid, which never fails to increase, at last brings on a complete eversion of the part. In these cases, the cure may be accomplished with such success, as is surprising to the inexperienced; for, after the fungous swelling of the internal membrane of the eyelid has been cut off, and the edge of the part approximated to the eyeball, the shortening of the eyelid, remaining after the operation, is so trivial, that it may be considered as nothing, in comparison with the deformity and inconvenience occasioned by the ectropium. Whenever, therefore, the retraction of the skin of the everted eyelid, and the consequent short-

ness of it, are such, as not to prevent its rising again and covering the eye, if not entirely, at least moderately, the surgeon should cut away the internal membrane of the everted eyelid, as already explained, so as to produce a loss of substance on the inside of the everted eyelid. This may be done, as most convenient, either with the convex-edged curved scissars, or small convex-edged bistoury. In inveterate cases of ectropium, in which the tumid lining of the eyelids has become hard and callous, it is best to apply to the everted eyelid, for a few days before the operation, a soft bread and milk poultice, in order to render the part flexible, and more easily separated, than it could be in its former rigid state.

It is a most certain truth, that making a division of the cicatrices, which have given rise to the shortening and eversion of the eye-lid, does not procure any permanent elongation of this part, and consequently it is of no avail in the cure of the present disease. We see the same circumstance occur after deep and extensive burns of the skin of the palm of the hand and fingers: whatever pains may have been taken, during the treatment to keep the hand and fingers extended, no sooner is the cicatrization thus completed, than the fingers become irremediably bent. The same thing happens after extensive burns of the skin of the face and neck. Fabricius ab Aquapendente, who well knew the inutility of making a semilunar cut in the skin of the eye-lids, for the purpose of remedying their shortening and eversion, proposes, as the best expedient, to stretch them with adhesive plasters, applied to them and the eyebrow, and tied closely together. Whatever advantage may result from this practice, the same degree of benefit may be derived from using, for a few days, a bread and milk poultice, afterwards oily embrocations, and, lastly, the uniting bandage, so put on as to stretch the shortened eyelid, in an opposite direction to that produced by the cicatrix. This practice should always be carefully tried, before resorting to the operation.

The patient being seated, if an adult, or placed on a table with his head a little elevated, and held by proper assistants, if a child, the surgeon, with a small convex-edged bistoury, is to make an incision of sufficient depth into the internal membrane of the eye-lid, along the tarsus, carefully avoiding the situation of the puncta lachrymalia. Then he should raise with a pair of forceps, the flap of the divided fungous membrane, and continue to detach it, with the bistoury, from the subjacent parts, all over the inner surface of the eye-lid, as far as where the membrane quits this part, to be reflected over the front of the eye, under the name of *conjunctiva*. The separation being thus far accomplished, the membrane is to be raised still more with the forceps, and cut off with one, or two strokes of the scissars, at the lowest part of the eye-lid. The compresses and bandage, to keep the eye-lid replaced, are to be applied, as above directed. On changing the dressings, a day, or two, after the operation, the eye-lid will be found, in a great measure, replaced, and the disfigurement, which it caused, greatly amended. The operation is rarely followed by bad symptoms, such as vomiting, violent pain, and inflammation. However, should they occur, the vomiting may be relieved by means of an opiate clyster, and, as for the pain and inflammation, attended with great tumefaction of the eye-lid operated upon, these complaints may be cured by applying a poultice, or bags filled with emollient herbs, at the same time employing internal antiphlogistics, until the inflammation and swelling have subsided, and suppuration has commenced on the inside of the eyelid, on which the operation has been done. After this, the treatment is to consist in washing the part, twice a day, with barley-water and mel. rosæ, and, lastly, in touching the wound a few times with the argentum nitratum, in order to keep the granulations within certain limits, and to form a permanent cicatrix, proper for maintaining the eye-lid replaced. (*Scarpa sulle Malattie degli Occhi.*)

ECTYLO'TICA. Medicines, which destroy callous indurations, and corns.

ECZEMA, or ECZE'SMA (from ἐκζέω, to boil out.) A hot painful eruption, or pustule. Mr. Pearson calls the erythema mercuriale, *eczéma mercuriale*. (See *Mercury*.)

EDRA. A fracture, attended with an impression upon the bone, made by the instrument, which produced the accident.

EFFLORESCENCE. A redness of the skin.

EFFRACTURA. (from *effringo*, to break down.) A species of fracture, in which the bone is much depressed by the blow.

EFFUSION. (from *effundo*, to pour out.) In surgery, means the escape of any fluid out of the vessel, or viscus, naturally containing it, and its lodgment in another cavity, in the cellular substance, or in the substance of parts. Thus, when the chest is wounded, blood is sometimes effused from the vessels into the cavity of the pleura; in cases of false aneurims, the blood gets out of the artery into the interstices of the cellular substance; in

cases of fistulæ in perineo, the urine gets from the bladder and urethra into the cellular membrane of the perineum and scrotum; and, when great violence is applied to the skull, blood is often effused even in the very substance of the brain.

Effusion also sometimes signifies the natural secretion of fluids from the vessels: thus surgeons frequently speak of the coagulable lymph being effused on different surfaces. (See *Extravasation.*)

ELCOSIS. (from ἕλκος, an ulcer.) A term having the same meaning as ulceration.

ELECTRICITY. The following account of this subject, as it relates to surgery, is extracted from a work, that abounds with useful information, and has long been out of print: I mean the Pharmacopoeia Chirurgica, by an anonymous writer.

Among the aids of surgery, electricity once held a conspicuous and important situation. It has, however, met with a fate, not unusual with remedies too much cried up and too indiscriminately employed; that of having fallen, in a great degree, into neglect.

Whatever its effects, however, on the system may be, it certainly possesses this advantage over other topical remedies, that it may be made to act on parts very remote from the surface. By its application in repeated *shocks*, we are sometimes able to restore the action of those nerves, whose diseases may have impaired the senses; and by its use in the way of *friction*, or by drawing *sparks*, complaints of a more superficial nature are removed.

According to Mr. Birch "the applications of the electric fluid to the diseases of the human body, may be all comprised under three heads. 1st. Under the form of *radii*, when projected from a point. 2d. That of a *spark*, when many of these radii are concentered on a ball. 3d. Under that of a *globe*, when many of these sparks are condensed in a Leyden jar." (See *Adams's Essay on Electricity.*)

Under the first form, electricity is very advantageously applied, in inflammation of the eye, or any other highly sensible part.

Under the second, its action may be serviceable, in cases where the common skin can be stimulated with less reserve; as in local inflammations, sprains, bruises, contractions, tumours, paralytic affections, &c.

In the way of repeated shocks, it is likewise of service in the same cases; and is usually employed alternately with the other forms of electricity.

The electrical fluid, as a topical remedy, has been chiefly confined to the following diseases; viz. superficial inflammation, ophthalmia, gutta serena, deafness, scrofulous enlargements, anomalous tumours, fistula lachrymalis, ulcers, cutaneous eruptions, cancers, and abscesses.

Instances are upon record, of its success, in *suddenly* restoring the sight in gutta serena, the hearing in deafness, and the speech in dumbness, even of many years continuance. It is indeed the performance of a *miracle* of this sort *now and then*, that has led us to expect, what however no practitioner ever has found in it, a remedy, *uniform in its good effects.* It is peculiar perhaps to electricity, that it will sometimes do what is not at all expected from it, whilst, on the other hand, it is continually disappointing us in our common intentions. Perhaps the most accurate way in which we can speak of electricity as a remedy in local affections is that suggested by Mr. Abernethy, viz. that it has a tendency to promote *whatever action or process happens to be going on in a diseased part at the time of its application.*

Amongst the means employed to restore the vital functions, in cases of hanging, drowning, &c. electricity possesses a considerable share of importance; since, by proper management, the heart, lungs, brain and nerves, &c. may be subjected to its salutary stimulus. But its success in this, and indeed every instance, will depend on the perfection of the apparatus employed, and the judgment of the operator in directing the force of the electric fluid.

In the *venereal disease*, electricity is said to be injurious; for what reason, has never yet been satisfactorily explained; neither indeed is the fact itself well ascertained. It ought to be observed, however, that there is a great singularity attending its use in those persons who are under the effects of a mercurial course. In these, the shock, or even the spark, is attended with considerable more pain than in common instances; and Mr. Hunter mentions the case of a person on whose complaint electricity had no effect, *till* mercury was administered, after which the same remedy produced a cure.

The discoveries of Galvani on the peculiar electricity of animal bodies, may possibly throw some light, in the course of time, on the *modus operandi* of the electrical fluid. At present, we are not acquainted with its properties, farther than the evidence we possess of its action as a stimulant. (*Pharm. Chirurg.*)

ELEVATOR. *Elevatorium.* An instrument for raising depressed portions of the skull.

Besides the common elevator, now generally preferred by all the best operators, several others have been invented; as, for instance, the tripod elevator, and another, which was first devised by M.

J. L. Petit, and afterwards improved by M. Louis.

The common elevator is an exceedingly simple kind of instrument, being in fact a mere lever, the end of which is somewhat bent, and made rough, in order that it may be less apt to slip away from the piece of bone, which is to be raised. This instrument may be used by forming a fulcrum for it, either in the hand, which holds it, or upon the fingers of the other hand; or the operator may make a fixed point for it on the edge of the opening made with the trephine, or of that, which the accidental violence has occasioned. In the first case, it has been objected, that the instrument cannot be employed with much force; the hand may give way; or, the elevator may slip from the bone, against which it presses, and thus produce a considerable concussion. In the second case, it is objected, that the part, on which the instrument is placed, may be forced inward.

Such were the reasons, which led to the invention of the tripod elevator, one piece of which consists of three branches uniting above into one common trunk. This last part of the elevator is pervaded by a long screw, having below a kind of hook, and above a sort of handle for turning it. It is with the hook, that the depressed portion of bone is to be elevated. It is to be introduced into the opening made in the cranium, as soon as the elevator has been put in a proper position; and it is to be made to ascend by turning the screw. Formerly, the tripod elevator was also sometimes used conjointly with a sort of screw, which was first fixed in the piece of bone about to be elevated, and then drawn upward, by placing the hook in a ring, that was attached to its upper part.

The inventors of the tripod elevator were certainly very well acquainted with the imperfections of the common one; and they endeavoured to obviate them, by procuring a firmer fulcrum, and a greater degree of power. But, it was necessary to change the situation of their elevator, as often as there was occasion to raise a different portion of bone; and the hook also being connected with an inflexible piece of steel, the direction of which was always the same as that of the instrument, it became troublesome and difficult to place the hook under the piece of bone, which stood in need of being raised.

These inconveniences caused M. J. L. Petit to invent a new elevator. This consisted of a lever, mounted on a handle, and straight throughout its whole length, except just at its very end, which was slightly curved, in order that it might be more conveniently put under the portion of bone, which was about to be elevated. The lever was pierced at various distances from its bent end, with several holes, intended for the reception of a little kind of moveable screw-peg, which was fixed upon the top of a sort of bridge. This latter part of the instrument consisted of a kind of arch, the ends of which were long and covered with small pads, while, on its centre, was placed the little screw-peg already mentioned. It was the intention of M. Petit, that the peg should be joined to the bridge by means of a hinge; and as he found, that it was frequently necessary to elevate several different pieces of bone, he thought, that the peg should not be completely fastened in the hole, but that it should be capable of being moved about in any wished for direction. With this construction, however, it was found, that the peg would only allow the lever to be applied with its edge obliquely, under the bone about to be raised, when the part of the cranium was situated to the right, or left.

M. Louis conceived, that it would be a great improvement of Petit's elevator, if a sort of pivot were substituted for the hinge. The lever would then admit of being readily moved in every direction, and put under any point of bone, without any occasion to alter the position of the bridge or fulcrum.

I have only to add, respecting elevators for fractures of the skull; that all the best modern surgeons content themselves with the common one, which is most simple, and, in the hands of a surgeon, who knows how to use it, is found to answer every desirable purpose.

ELUXATIO. (from *eluxo*, to put out of joint.) A dislocation.

ELYTROCELE. (from ελυτρον, the vagina, and κηλη, a tumour.) A hernia in the vagina.

EMBRUGMA. (from εμβρεχω, to make wet.) An embrocation.

EMBROCATION. (from εμβρεχω, to make wet.) *Embrocatio.* Strictly a fluid application made to any part of the body. Many use the term, however, synonymously with liniment. The following embrocations are noticed in the *Pharmacopœia Chirurgica.*

EMBROCATIO ALUMINIS. ℞. Aluminis ʒij. Aceti spiritûs vinosi tenuioris, sing. ℔ss. For chilblains, and diseased joints.

EMBROCATIO AMMONIÆ. ℞. Embrocat. ammon. Acet. cum sapone ʒij. Aq. ammon. pur. ʒij. M. For sprains and bruises.

EMBROCATIO AMMONIÆ ACETATÆ CAMPHORATÆ. ℞. Solut. saponis cum camphorâ, Aq. ammon. acet. sing. ʒj. Aq. ammon. pur. ʒss. M. For

sprains and bruises. It is also frequently applied to disperse chilblains, which have not suppurated. Said to be the same as Steers's opodeldoc.

EMBROCATIO AMMONIÆ ACETATÆ. ℞. Aq. ammon. acet. Solut. sapon. sing. ℥j. M. For bruises with inflammation.

EMBROCATIO CANTHARIDIS CUM CAMPHORA. ℞. Tinct. cantharidis. Spirit. camph. sing. ℥j. M. This may be used in any case, in which the object is to stimulate the skin. The absorption of cantharides, however, may bring on a strangury.

EMBRYOTOMIA. (from ἐμβρυον, a fœtus, and τεμνω, to cut.) The operation of cutting into the womb, in order to extract the fœtus. (See *Cæsarean Operation.*)

EMOLLIENTS. (from *emollio*, to soften.) Such applications, as have the property of softening and relaxing parts.

EMPHYSEMA. (from ἐμφυσαω, to inflate.) A swelling produced by air being diffused in the cellular substance.

The common cause of this affection is a fractured rib, by which the vesicles of the lungs being wounded, the air escapes through them into the cavity of the thorax. But, as the rib on being fractured, and pushed inwards, wounds the pleura, which lines the ribs and intercostal muscles, part of the air most commonly gets through the pleura, and those lacerated muscles into the cellular membrane, which is on the outside of the chest, and thence it is diffused through the same membrane over the whole body, so as to inflate it sometimes to an extraordinary degree. This inflation of the cellular membrane has been commonly looked upon, as the most dangerous part of the disease; how justly, will appear in the sequel. (*Hewson, Med. Obs. and Inquiries, Vol. 3.*)

Emphysema is most frequent after a fractured rib, because there is, in this instance a wide laceration of the lungs, and no exit for the air; it is less frequent in large wounds with a knife, or broad sword, because the air has an open and unimpeded issue; it is again more frequent in deep stabs with bayonets, or small swords; and it is peculiarly frequent in gun-shot wounds, because the orifice in the skin inflames, and swells, while the wound is wider within. (*John Bell on Wounds of the Breast.*)

The symptoms, attending emphysema, are generally the following kind. The patient at first complains of a considerable tightness of the chest, with pain, chiefly in the situation of the injury, and great difficulty of breathing. This obstruction of respiration gradually increases and becomes more and more insupportable. The patient soon finds himself unable to lie down in bed, and cannot breathe, unless when his body is in an upright posture, or he is sitting a little inclined forward. The countenance becomes red and swollen. The pulse, at first, weak and contracted, becomes afterwards irregular. The extremities grow cold, and, if the patient continue unrelieved, he soon dies, to every appearance suffocated.

The emphysematous swelling, wheresoever situated, is easily distinguished from œdema, or anasarca, by the crepitation, which occurs on handling it, or a noise, like that which takes place on compressing a dry bladder half filled with air. (*Encyclopédie Méthodique; Partie Chirurgicale, Art. Emphysema.*)

The wound of the pleura and intercostals may sometimes be too small to suffer the air to get readily into the cellular membrane, and to inflate it, but may confine a part of it in the cavity of the thorax, so as to compress the lungs, prevent their expansion, and cause the same symptoms of tightness of the chest, quick breathing, and sense of suffocation, which water does in the hydrops pectoris, or matter in the empyema. (*Hewson.*)

To understand, why the air passes at all out of the wound of the lungs, we must advert to the manner, in which inspiration and expiration are naturally carried on. It is well known, that in the perfect state, the surface of the lungs always lies in close contact with the membrane lining the chest, both in inspiration and expiration. The lungs themselves are only passive organs, and are quite incapable, by any action of their own, to expand and contract, so as to maintain their external surface constantly in contact with the inside of the thorax, which is continually undergoing an alternate change of dimensions. Every muscle, that has any concern in enlarging and diminishing the capacity of the chest, must contribute to the effect of adapting the volume of the lungs to the cavity, in which they are contained, as long as there is no communication between the cavity of the pleura, and the external air. In inspiration, the thorax is enlarged in every direction, the lungs are expanded in the same way, and the air entering through the wind-pipe into the air-cells of these organs, prevents the occurrence of a vacuum.

But, in cases of wounds, when there is a free communication between the atmosphere and inside of the chest, on this cavity being expanded, the air naturally enters it at the same time, and for the same reasons, that the air enters the lungs through the trachea, and the lung itself remains proportionally collapsed. When the thorax is next contracted, in expi-

ration, the air is compressed out of the lung, and also, out of the bag of the pleura, through the external wound, if there be a direct one. In the latter circumstance, the emphysematous swelling is never very extensive.

But, in the case of a fractured rib, attended with a breach in the pleura costalis, pleura pulmonalis, and some of the air-cells of the lungs, there is no direct communication between the cavity of the chest and the external air; in other words, there is no outward wound in the parietes of the thorax. There is, however, a preternatural opening formed between the air-cells of the lungs and the cavity of the chest, and also another one between the latter space, and the general cellular substance of the body, through the breach in the pleura costalis. The consequence is, that, when the chest is expanded in inspiration, air rushes from the wound in the surface of the lungs, and insinuates itself between them and the pleura costalis. The lungs collapse in proportion, and the place, which they naturally occupied, when distended, is now occupied by the air. When, in expiration, the dimensions of the chest are every where diminished, the air, now lodged in the bag of the pleura, cannot get back into the aperture in the collapsed lung, because this is already full of air, and is equally compressed on every side, by that which is confined in the thorax. Were there no breach in the pleura costalis, this air could not now become diffused; the muscles of inspiration would next enlarge the chest, remove the pressure from the surface of the wounded lung, more air would be sucked out of it, as it were, into the space between the pleura costalis and pleura pulmonalis, and this process would go on, till the lungs of the wounded side were completely collapsed. But, in the case of a fractured rib, or of a narrow stab, in which there is also a breach in the pleura costalis, without any free vent outward, for the air, which gets out of the lung into the cavity of the pleura, as soon as the expiratory powers lessen the capacity of the chest, this air, not being able to get back through the breach in the collapsed lung, passes through the laceration, or wound, in the pleura costalis, into the common cellular substance.

It is through the communicating cells of this structure, that the air becomes diffused most extensively over the whole body, in proportion as the expiratory muscles continue in their turn to lessen the capacity of the chest, and pump the air, as it were, through the breach in the pleura costalis, immediately after it has been sucked, as it were, out of the wound in the lung, in inspiration. (See *John Bell on Wounds of the Breast, Halliday on Emphysema*, 1807.)

To prove that the confinement of air in the chest is the cause of the dangerous symptoms attending emphysema, Mr. Hewson adverts to the histories of some most remarkable cases, published by M. Littre, M. Mery, Dr. Hunter, and Mr. Cheston. (See *Mem. de l'Acad. Royale des Sciences, for* 1713. *Med. Observations and Inquiries, Vol.* 2, *and Pathological Inquiries.*)

In M. Littre's case, the patient, who had been wounded in the side with a sword, could not breathe, without making the most violent efforts, especially, during the latter part of his disease: he died on the fifth day.

In M. Mery's case, a man had the fourth and fifth true ribs broken by a coach passing over his chest, his respiration was much impeded from the first, and became more and more difficult, till he died, which was on the fourth day after the accident.

In Dr. Hunter's case, the patient had received a considerable hurt on his side by a fall from his horse. He had a difficulty of breathing, which increased in proportion as the skin became elevated and tense; it was laborious as well as frequent. His inspiration was short, and almost instantaneous, and ended with a catch in the throat, which was produced by the shutting of the glottis; after this he strained to expire for a moment without any noise, then suddenly opening the glottis, he forced out his breath with a sort of groan, and in a hurry, and then quickly inspired again; so that his endeavours seemed to be to keep his lungs always full; inspiration succeeded expiration as fast as possible. He said, his difficulty of breathing was owing to an oppression or tightness across his breast, near the pit of the stomach. He had a little cough, which exasperated his pain, and he brought up blood and phlegm from his lungs. He was relieved by scarifications, and recovered.

In Mr. Cheston's case, the man had received a blow on the chest. He had a constant cough, bringing up, after many ineffectual efforts, a frothy discharge, lightly tinctured with blood; he seemed to be in the greatest agonies, and under a constant appearance of suffocation. His pulse was irregular, and sometimes scarcely to be felt, his face livid, and, when he was sensible, which was only now and then, he complained of a pain in his head. On passing a bandage round his chest, with a proper compress to prevent the discharge of air into the cellular membrane, and to confine the motion of the thorax, the patient cried out, that he could not suffer it. A strong

compression by the hand alone affected him in the same way. Notwithstanding, bleeding, repeated scarifications, and other means, his sense of suffocation, and difficulty of breathing increased. On the fourth day, the air no longer got into the cellular membrane, when on a sudden inclining his head backward as it were, for the admission of more air, than usual, his breathing became more difficult and interrupted, he turned wholly insensible, and soon afterwards died.

M. Littre, M. Mery, and Mr. Cheston, opened their patients after death.

M. Littre, besides a wound of the lungs and fractured rib, found a considerable quantity of blood in the cavity of the thorax, and was sensible of some putrid air escaping, on his first puncturing the intercostals and pleura. The wounded lobe was hard and black, and the other two of the same side were inflamed.

In M. Mery's patient, no blood was extravasated, nor was there any thing preternatural, except the fractured ribs, the wound of the pleura, and that of the lungs.

Mr. Cheston found a fracture of the tenth and eleventh ribs, and a wound of the lungs. The lungs, below the wound, were livid, and more compact, than usual; but every thing else was natural, no extravasation, no inflammation, no internal emphysema.

Mr. Hewson made experiments on animals to shew, that air in their chests produced great difficulty of breathing, such as occurs in cases of emphysema, and in one case, which he examined after death, air was actually discharged on puncturing the thorax.

The object of Mr. Hewson's paper is to recommend making an opening into the chest, for the purpose of giving vent to the air confined in that cavity, just as is done for the discharge of pus, in cases of empyema, and water, in those of hydrops pectoris.

In wounds of the lungs, says this author, whether occasioned by fractured ribs, or other causes, when symptoms of tightness and suffocation come on, so far should we be from dreading the emphysematous swelling of the cellular membrane, that we should rather consider it, as a favourable symptom, shewing that the air is not likely to be confined in the thorax; and so far should we be from compressing the wound to prevent the inflation, or emphysema, that we should rather dilate it (if not large enough already), or perform the paracentesis thoracis. We may judge of the necessity of this operation from the violence of the symptoms, such as the oppressed breathing, &c. For when these are not considerable, and the air gets out of the chest with sufficient freedom, the operation then becomes unnecessary.

The best place for performing the operation, says Mr. Hewson, if the disease is on the right side, will be on the fore-part of the chest, between the fifth and sixth ribs; for, there the integuments are thin, and, in the case of air, no depending drain is required. But, if the disease is on the left side, it will be more advisable to make the opening between the seventh and eighth, or eighth and ninth ribs, that we may be sure of avoiding the pericardium. As large penetrating wounds are inconvenient on account of the air entering by the aperture in such a quantity, *as to prevent the expansion of the lungs*, a small wound will be eligible, and especially as air does not require a large one for its escape. Mr. Hewson recommends dissecting cautiously with a knife, in preference to the coarse and hazardous method of thrusting in a trocar.

There is one error, prevailing in Mr. Hewson's paper, for which he has been justly criticized by Mr. John Bell; viz. the idea, that it is possible and proper to make the collapsed lung expand by making an opening into the chest, in cases of emphysema. Bromfield and B. Bell have both imbibed the same erroneous opinions, and proposed plans for exhausting the air and expanding the lung. It is very certain, that it is impracticable to make the collapsed viscus expand, until the breach in it is closed, and this closure is greatly promoted by the quiet state, in which the collapsed lung remains; a state, also, the most favourable for the stoppage of any bleeding from the pulmonary vessels.

The true object then of making an opening into the thorax, when the symptoms of suffocation are very violent in cases of emphysema, is not to obtain an expansion of the lung on the affected side, nor to take the pressure of the air from it; but, to remove the pressure caused on the opposite lung by the distention of the mediastinum, and, at the same time, to diminish the pressure of the air on the diaphragm. The lung on the affected side must continue collapsed, and it is most advantageous, that it should do so. The opposite lung is that, which for a time must of itself carry on respiration, and it is known to be fully adequate to this function, provided the quantity of air, on the other side of the chest, does not produce too much pressure on the mediastinum, and diaphragm.

Mr. John Bell concludes his remarks on this subject, with advising the following practice. 1st. Upon observing the crackling tumour beginning to form itself over a fractured rib, you should make small punctures with the point of a

lancet, as in bleeding; and if the point be struck deep enough, the air will rush out audibly. But, as this air was in the thorax, before it came into the cellular substance, it is plain, that the thorax is still full, and that the lung of that side is already collapsed and useless, and must continue so. The purpose, therefore, of making these scarifications, and, especially, of making them so near the fractured part, is not to relieve the lungs, but, merely, to prevent the air spreading more widely beneath the skin.

2nd. If, before you arrive, the air shall have spread to very remote parts of the body, as to the scrotum, and down the thighs, it will be easier to make small punctures in those parts, to let out the air directly, than to press it along the whole body, till you bring it up to the punctures made on the chest, over the wounded part.

3rd. If, notwithstanding free punctures, and pressing out the air in this way, you should find by the oppression, that either air, or blood, is accumulating within the cavity of the thorax, so as to oppress not the wounded lung only, which was of course collapsed and useless from the first, but so as to oppress also the diaphragm, and through the diaphragm to affect also the sound lung; then a freer incision must be made, through the skin and muscles, and a small one delicately into the thorax to let out the confined air, or blood. (*John Bell.*)

After a few days, the wound, in the collapsed lung, becomes closed by the adhesive inflammation around it, so that the air no longer gets out of it into the cavity of the chest, and any extensive opening may be healed. What air is already there is ultimately absorbed, and the lung, expanding in proportion, resumes its original functions. Emphysema has been known to arise from the bursting of a vomica, and ulceration of the surface of the lungs; but, the air, which escapes, in this instance, cannot find its way into the cavity of the thorax, because the inflammation, which precedes the abscess and ulceration of the air-cells, closes those which are adjacent, and produces an adhesion of the edges of the vomica, or ulcer, to the inner surface of the chest, so as entirely to separate the two cavities. We are not acquainted with any instance of the symptoms, imputed to the confinement of air in the chest, originating from suppuration and ulceration of the surface of the lungs; but, Palfyn, Dr. Hunter, and the author of the article *Emphysema*, in the Encyclopédie Méthodique, Partie Chirurgicale, have seen cases, in which emphysema has arisen from abscesses of the lungs, attended with adhesion to the pleura, and ulcerations in the situation of such adhesion. In these instances, the pus having made its way through the pleura and intercostal muscles, the air escapes also through the same track, so as to get into the cellular membrane on the outside of the chest.

A violent effort of respiration has, sometimes, produced a certain degree of emphysema, which first makes its appearance about the clavicles, and afterwards spreads over the neck and adjacent parts. The efforts of labour have been known to occasion a similar symptom; but, no bad consequences followed. (*Medical Communications, p.* 176, *and Wilmer's Obs. in Surgery, p.* 143.)

M. Louis has described an emphysema of this sort, which, on account of its cause, and the indication, which it furnishes to the practitioner, is highly important. This famous surgeon had occasion to remark it in a young girl, who died suffocated, from a bean falling into her windpipe, and he considers it, as a pathognomonic symptom of such an accident, concerning the existence of which it is so essential not to commit any mistake. (See *Bronchotomy.*) This emphysema made its appearance on both sides of the neck, above the clavicles, and came on suddenly, on the third day after the accident. The inspection of the body proved, that the lungs and mediastinum were also in an emphysematous state. The retention of the air, confined by the foreign body, produced, says M. Louis, at each attempt to expire, and, especially, when the violent fits of coughing occurred, a strong propulsion of this fluid towards the surface of the lung, into the spongy substance of this viscus. Thence, the air passed into the cellular texture, which unites the surface of the lung to the pleura pulmonalis; and, by communications from cells to cells, it caused a prodigious swelling of the cellular substance, between the two layers of the mediastinum. The emphysema, increasing, at length made its appearance above the clavicles. This tumefaction of the lung, and surrounding parts, in consequence of air getting into their spongy, and cellular texture, is an evident cause of suffocation, and, the swelling seems so natural an effect of the presence of a foreign body in the trachea, that one can hardly fail to think it an essential symptom, though no author has made mention of it. (*Mémoires de l'Acad. de Chirurgie, Tom.* 4, *in* 4*to.*)

An emphysematous swelling of the head, neck, and chest, has also been noticed in typhoid fevers. Dr. Huxham relates an instance, of this sort, in a sailor of a scorbutic habit. (*Medical Observations and Inquiries, Vol.* 3, *Art.* 4.) A case of spontaneous emphysema has likewise been described by Dr. Baillie. (See

Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. 1, *p.* 202.)

A curious example of what has been called, a spontaneous emphysema, is recorded by Mr. Allan Burns: "The patient was a strong athletic man, who, about six years previous to his application at the Royal Infirmary, had received a smart blow on the neck, from the keel of a boat. This injury was soon followed by the formation of a firm tense tumour, on the place, which had been hurt. The swelling increased very slowly, during the five years immediately succeeding its commencement; but, during the sixth, it received a very rapid addition to its bulk. At this time, it measured nearly six inches in diameter, seemed to be confined by a firm and dense covering, and the morbid parts had an obscure fluctuation. From the first to the last, the tumour had been productive of very little pain.

"Judging from the apparent fluctuation, that the tumour was encysted, it was resolved, at a consultation, to puncture the swelling, draw off its contents, and then pass a seton through it. By plunging a lancet into it, only a very small quantity of blood, partly coagulated, and partly fluid, was discharged,—a quantity so trifling, that, after its evacuation, the size of the tumour was not perceptibly reduced. A seton was passed through the swelling. At this time, the man was in perfect health.

"About ten hours after the operation, the patient was seized with extremely violent rigors, followed by heat, thirst, pain in the back, excessive pain in the tumours and oppressive sickness.

"An emetic was prescribed, but, instead of producing vomiting, it operated as a cathartic. To remove the irritation the seton was withdrawn. The pain in the tumour, however, and the general uneasiness continued to increase, and thirty hours subsequent to making the puncture, air began to issue from the track of the seton; and, afterwards the cellular membrane of the neck, and of the other parts of the body in succession, became distended with a gaseous fluid. In the course of a few hours, after the commencement of the general emphysema, the man died.

"Twelve hours after death, when the body was free from putrefaction, it was inspected. The emphysema was neither increased, nor diminished since death, and some idea may be formed of its extent, when the scrotum was distended to the size of the head of an adult. Even the cavities of the heart, and the canals of the blood-vessels, contained a considerable quantity of air. We could discover no direct communication between the tumour and the trachea or lungs, although such was carefully sought for." (*A. Burns on the Surgical Anatomy of the Head and Neck, p.* 51—53.)

From such cases, we may infer, with the preceding writer, that from the mere rupture of a few of the bronchial cells, occasioned by irregular action of the lungs, or by some other internal cause, a spontaneous diffusion of air may take place in the cellular texture of the body. Such examples are dependent on the same cause as the emphysema from injury of the lungs; only the rupture of the bronchial cells in the former cases is less obvious.

Surgeons often observe a partial emphysema, in cases of gangrene.

Here, however, it is hardly necessary to observe, the air is the product of putrefaction, and the disorder has not the smallest connexion with any injury, or disease of the air-cells of the lungs.

The reader may consult, with advantage, *l'Encyclopédie Méthodique, Partie Chirurgicale. Hewson's Paper in Medical Observations and Inquiries, Vol.* 3. *Mem. de l'Acad. Royale des Sciences, for* 1713. *Dr. Hunter in Medical Observations and Inquiries, Vol.* 2. *Cheston in Pathological Inquiries. A Case in Abernethy's Works. John Bell on Wounds of the Breast. Halliday on Emphysema,* 1807. *Allan Burns on the Surgical Anatomy of the Head and Neck, p.* 52, *&c. Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol.* 1, *p.* 202. *Wilmer's Observations in Surgery, p.* 143. *Richerand's Nosographie Chirurgicale, Tom.* 4, *p.* 164, *Edit.* 2. *Lassus Pathologie Chirurgicale, Tom.* 2, *p.* 321, *&c. Edit.* 1809.

EMPLASTRUM. (from εμπλασσω, to spread upon.) A plaster.

The following are some of the most useful plasters, employed in surgery.

EMPLASTRUM AMMONIACI CUM ACETO. ℞. Ammoniaci ℥ij. Aceti Distillati ℥iij. Ammoniacum in aceto liquefactum evapora in vase ferreo ad emplastri crassitudinem.

EMPLASTRUM AMMONIACI SCILLITICUM. ℞. Gumm. ammoniaci ℥j. Aceti Scillitici, q. s. ut fiant emplastrum, quò pars affecta tegatur.

Mr. Ford has found this last plaster useful in some scrofulous affections. It may be rendered more stimulating by sprinkling it with squills. (*Ford on the Hip-joint, p.* 59.) It has been recommended by Swediaur; *London Medical Journal, Vol.* 1, *p.* 198.

The first plaster partakes of the same stimulating property, though in a milder degree.

EMPLASTRUM AMMONIACI CUM HYDRARGYRO. Discutient.

EMPLASTRUM AMMONIACI CUM CICUTA. ℞. Gum. ammon. ℥iij.

Succi cicutæ spissatæ ʒij. Aq. litharg. acet. ʒj.

Dissolve the ammoniacum in a little vinegar of squills, then add the other ingredients, and boil them all slowly to the consistence of a plaster. This is discutient.

EMPLASTRUM AMMONIÆ. ℞. Sapon. ʒij. Emplastr. litharg. ℥ss. Ammon. mur. ʒj.

The two first articles are to be melted together, and when nearly cold, the muriated ammonia, finely powdered, is to be added. Its use is to stimulate the skin, and excite the action of the absorbents. Hence, it disperses many chronic swellings and indurations.

EMPLASTRUM CANTHARIDIS VEL LYTTÆ. (See *Blister.*)

EMPLASTRUM GALBANI COMPOSITUM. L. P. (*Olim emplastrum lithargyri comp.*) Properties discutient.

EMPLASTRUM HYDRARGYRI. L. P. (*Olim emplastrum litharg. cum hydrargyro.*) Properties discutient.

EMPLASTRUM LYTTÆ. L. P.— (See *Blister.*)

EMPLASTRUM PLUMBI. L. P.— (*Olim emplastrum lithargyri, or diachylon plaster.*)

EMPLASTRUM RESINÆ. L. P.— (*Olim emplastrum lithargyri cum resina.*) The common adhesive, or sticking plaster.

EMPLASTRUM SAPONIS. The plaster commonly used for fractures. It is also frequently applied to bruised parts, and to many indurations of a chronic nature.

EMPROSTHOTONOS. (from εμπροσθεν, before or forwards, and τεινω, to extend.) A spasmodic, or tetanic, affection, in which the body is bent forwards.

EMPYEMA. (from εν, within, and πυον, pus, or matter.) A collection of purulent matter in the cavity of the chest.

The ancients made use of the word, "empyema" to express every kind of internal suppuration. It was Ætius, who first restricted the term to the collections of matter, which sometimes form in the cavity of the pleura, or membrane lining the chest; and all the best modern surgeons invariably attach this meaning alone to the expression.

The operation for empyema properly means the making of an opening into the thorax, for the purpose of giving vent to the matter, collected in the cavity of the pleura, though the phrase with several writers denotes making an incision into the chest, in order to let out any effused, or confined fluid, whether matter, blood, an aqueous fluid, or even air. The necessity for having recourse to such an operation, however, does not often present itself. I would not wish to be supposed to assert, that inflammation of the lungs, pleura, mediastinum, diaphragm, and even of the liver, does not sometimes terminate in suppuration. Certainly, the latter event is occasionally produced; but, when it does happen, the matter does not always make its way into the cavity of the chest. Very frequently external abscesses form, or the pus is either coughed up, or discharged with the stools.

When the surface of the lungs and that of the pleura costalis have become adherent to each other, in the situation of the abscess, the pus, always disposed by a law of nature to make its way to the surface of the body, occasions ulceration of the intercostal muscles, and collects on the outside of them. An abscess of this kind comes on with a deep seated pain in the part affected; an œdematous swelling, which retains the impression of the finger; and a fluctuation, which is at first not very distinct, but, from day to day, becomes more and more palpable, and, at length, leads the surgeon to make an opening.

If an opening be not made, when the fluctuation becomes perceptible, there is some risk of the matter insinuating itself into the cavity of the pleura, in consequence of the adhesion being in part destroyed by ulceration. M. Sabatier affirms, that the case may take this course, even when the abscess has been punctured, and while a free external opening exists; and this experienced surgeon has adduced a case in confirmation of such an occurrence. (See *Médecine Opératoire, Tom. 2, p.* 249.)

In the same manner, if inflammation should occur in the anterior mediastinum, and end in suppuration, the abscess may possibly burst into neither of the cavities of the chest; but, make its way outward, after having rendered the sternum carious, as happened in the example, recorded by Van Swieten. (*Comment. on Boerhaave's* 895th *Aphorism.*)

External injuries, such as the perforation of the sternum with a sword, (*Vanderviel, Obs.* 19, *Cent.* 1.) a contusion, a fracture, or a caries of this bone, may give rise to an abscess in the anterior mediastinum. Galen has recorded a memorable example, where the abscess was the consequence of a wound of the forepart of the chest. After the injury, which was in the region of the sternum, seemed to have got quite well, an abscess formed in the same situation, and being opened healed up. The part, however, soon inflamed and suppurated again. The abscess could not now be cured. A consultation was held, at which Galen attended. As the sternum was obviously carious, and the pulsation of the heart was visible, every one was afraid of undertaking the treat-

ment of the case, since, it was conceived, that it would be necessary to open the thorax itself. Galen, however, engaged to manage the treatment, without making any such opening, and he expressed his opinion, that he should be able to effect a cure. Not finding the bone so extensively diseased, as was apprehended, he even indulged considerable hopes of success. After the removal of a portion of the bone, he saw the heart quite exposed, (as is alleged) by reason of the pericardium having been destroyed by the previous disease. After the operation, the patient experienced a speedy recovery.

J. L. Petit met with a case of an abscess in the anterior mediastinum, in consequence of a gun-shot wound in the situation of the sternum. The injury had been merely dressed with some digestive application; no dilatation, nor any particular examination of the wound had been made. The patient, after being to all appearances quite well, and joining his regiment again, was soon taken ill with irregular shiverings, and other febrile symptoms. M. Petit probed the wound, and found the bone affected. As there was a difficulty of breathing, he suspected an abscess either in the diploe, or behind the sternum, and, consequently, he proposed laying the bone bare, and applying a trepan. This operation gave vent to some sanious matter, and, as soon as the inner part of the sternum was perforated, a quantity of pus was discharged. The patient was relieved, and afterwards recovered. (See *Petit's Traité des Maladies Chirurgicales, Tom.* 1, *p.* 80.)

When, in consequence of inflammation, an abscess forms deeply in the substance of the lungs, the pus more easily makes its way into the air-cells, and tends towards the bronchia, than towards the surface of the lungs. In this case, the patient spits up purulent matter. When the opening, by which the abscess has burst internally, is large, and the pus escapes from it in considerable quantity at a time, the patient is in some danger of being suffocated. However, if the opening be not immoderately large, and the pus, which is effused, be not too copious, a recovery may ensue. Abscesses in the substance of the diaphragm, and collections of matter in the liver, may also be discharged by the pus being coughed up from the trachea, when the parts affected have become connected with the lungs by adhesions, and abscesses of the liver are situated on its convex surface. When the collection of matter in the liver occupies any other situation, the abscess frequently makes its way into the colon, and the pus is discharged with the stools. Several cases of this kind are related by authors: Sabatier has recorded two in his Médecine Opératoire; Le Dran makes mention of others; and Pemberton, in his book on the Diseases of the Abdominal Viscera, p. 36, relates the occurrence of additional instances of a similar nature.

Acute and chronic abscesses not unfrequently form in the cellular substance, between the pleura and the ribs and intercostal muscles. A swelling occurs between two of those bones; the skin does not undergo any change of colour; a fluctuation is distinguishable, and sometimes an extensive œdema is observable. Such abscesses should be opened; the motions of respiration then both promote the exit of the matter, as well as the contraction of the cavity, in which it was lodged; and the disease, if unattended with caries, generally terminates favourably.

It often happens, however, that the ribs are carious, and then the cure is more tedious and difficult. A modern writer, indeed, informs us, that, when the inside of the rib is extensively carious, or when the caries is near the junction of the bone to the spine, the fistula is incurable. (*Lassus Pathologie Chirurgicale, Tom.* 1, *p.* 128, *Edit.* 1809.) On the other hand, another surgeon of vast experience recommends us, to endeavour to separate the diseased bone, either by cutting it away, or employing the trepan. (*Pelletan's Clinique Chirurgicale, Tom.* 3, *p.* 253.) Were a part of a diseased rib to admit of being sawn away, Mr. Hey's convex saw would be a more proper instrument for the purpose, than a trepan.

An abscess of the preceding kind may be so situated, and attended with such a pulsation, as greatly to resemble an aneurism of the origin of the aorta. An interesting case of this description is detailed by M. Pelletan, Tom. 3, p. 254. I shall now proceed to the consideration of empyema strictly so called. No surgical writer, with whom I am acquainted has treated, with more discrimination, than Mr. Samuel Sharp, of the symptoms produced by collections of matter in the chest. He remarks, that it has been almost universally taught, that, when a fluid is extravasated in the thorax, the patient can only lie on the diseased side, the weight of the incumbent fluid on the mediastinum becoming troublesome, if he places himself on the sound side. For the same reason, when there is fluid in both cavities of the thorax, the patient finds it most easy to lie on his back, or to lean forwards, in order that the fluid may neither press upon the mediastinum, nor the diaphragm. But, it is noticed by Mr. Sharp, that, however true this doctrine may prove in most instances, there are a few, in which, notwithstanding the extravasation, the patient does not complain of more inconvenience in one posture,

than another, nor even of any great difficulty of breathing. (See *Le Dran's Obs.* 217, and *Morchetti* 65.)

On this account, observes Mr. Sharp, it is sometimes less easy to determine, when the operation is requisite, than if we had so exact a criterion, as we are generally supposed to have. But, says he, though this may be wanting, there are some other circumstances, which will generally guide us with a reasonable certainty. He states, that the most infallible symptom of a large quantity of fluid in one of the cavities of the thorax, is a preternatural expansion of that side of the chest, where it lies; for, in proportion as the fluid accumulates, it will necessarily elevate the ribs on that side, and prevent them from contracting so much in expiration as the ribs on the other side. Mr. Sharp also refers to Le Dran's Observ. 211, vol. 1, in order to prove, that the pressure of the fluid on the lungs may sometimes be so great, as to make them collapse, and almost totally obstruct their function. When, therefore, says Mr. Sharp, the thorax becomes thus expanded, after a previous pulmonary disorder, and the case is attended with the symptoms of a suppuration, it is probably owing to a collection of matter. The patient, he observes, will also labour under a continual low fever, and a particular anxiety from the load of fluid.

Besides this dilatation of the cavity from an accumulation of the fluid, the patient will be sensible of an undulation, which is sometimes so evident, that a by-stander can plainly hear it in certain motions of the body. Mr. Sharp adds, that this was the case with a patient of his own, on whom he performed the operation; but, the fluid in this instance, he says, was very thin, being a serous matter, rather than pus.

According to the same author, it will also frequently happen, that though the skin and intercostal muscles are not inflamed, they will become œdematous in certain parts of the thorax; or, if they are not œdematous, they will be a little thickened. These symptoms, joined with the enlargement of the thorax, and the preceding affection of the pleura, or lungs, seem unquestionably to indicate the propriety of the operation. But, observes Mr. Sharp, amongst other motives to recommend it upon such an emergency, this is one, that if the operator should mistake the case, an incision of the intercostal muscles would neither be very painful, nor dangerous. (See *Critical Enquiry into the present State of Surgery, sect. on Empyema.*)

"The difficulty of lying on the side, opposite to the collection of pus," says Le Dran, "is always accounted a sign of an empyema. This sign, indeed, is in the affirmative; but, the want of it does not prove the negative; because, when there is adhesion of the lungs to the mediastinum, the patient may lie equally on both sides." (*Le Dran's Obs. p.* 108, *Edit.* 2.) The explanation of this circumstance, offered by Le Dran, is, that, when the cyst, in which the matter is contained, is between the mediastinum and the lungs, the mediastinum gradually yields to the volume of the pus, in proportion as it is formed, and the cyst in which it is contained becomes dilated; "whence habitude becomes a second nature." Whereas, in an empyecal person, in whom the lung is not adherent to the mediastinum, and who lies on the side opposite to that, on which the collection of pus is situated, the mediastinum is on a sudden loaded with an unusual weight of fluid. (*P.* 111.)

Richerand contends, that the difficulty of breathing, which patients with extravasated fluid in the chest experience in lying upon the side, opposite that on which the disease is situated, never originates, as has been commonly taught and believed, from the fluid pressing upon the mediastinum and opposite lung. "I have, (says he) produced artificial cases of hydrothorax, by injecting water into the thorax of several dead subjects, through a wound made in the side. This experiment can only be made on subjects, in which the lungs are not adherent to the parietes of the chest. In this way, from three to four pints of water were introduced. I then cautiously opened the opposite side of the chest: the ribs and lungs being removed, the mediastinum could be distinctly seen, reaching from the vertebræ to the sternum, and supporting, without yielding, the weight of the liquid, in whatever position the body was placed.

"It is evident, then, that patients, with thoracic extravasations, lie on the diseased side, in order not to obstruct the dilatation of the sound side of the respiratory organs, one part of which is already in a state of inaction. It is for the same reason, and in order not to increase the pain by the tension of the inflamed pleura, that pleuritic patients lie on the diseased side. The same thing is observable in peripneumony; in a word, in all affections of the parietes of the chest." (*Richerand, Nosographie Chirurgicale, Tom.* 4, *p.* 168, 169, *Edit.* 2.)

It appears to me, that there may be some truth in the foregoing statement; but, the experiments are far from being conclusive, with respect to the assertion, that, in cases of empyema, hydrothorax, &c. the fluid on one side of the chest does not compress the opposite lung. In the first place, the quantity of fluid is frequently much larger, than that which

Richerand injected. Secondly, although the mediastinum may not be apt to yield at once to the weight of a liquid suddenly injected into one side of the thorax; yet, it may do so by the gradual effect of disease. Thirdly, many of the phenomena of emphysema seem adverse to Richerand's inference.

Although surgeons should be aware, that patients with empyema can sometimes lie in any position, without particular aggravation of the difficulty of breathing, yet, it ought to be distinctly understood, that the generality of patients with this disease cannot place themselves on the side, opposite to that, on which the collection of pus is situated, without having their respiration very materially obstructed. Another circumstance, also, which deserves to be mentioned while we are treating of the symptoms of empyema, is, that the œdema of the integuments is sometimes not confined to the thorax, but extends to more remote parts, on the same side of the body as the collection of matter. Both the foregoing remarks are confirmed by an interesting case, which has been published by Mr. Hey, of Leeds.

Sep. 3, 1788, Mr. Hey was desired to visit John Wilkinson, who had been ill ten days of the influenza. The patient was found labouring under a fever, attended with cough, difficulty of breathing, and pain in the left side of the thorax. He was bled once; had repeated blisters applied to the chest; and took nitre and antimonials, with a smooth linctus to allay his cough. He was repeatedly relieved by these means, especially by the application of the blisters; but, repeatedly relapsed. At last, he became so ill, that he breathed with the utmost difficulty, and "could not lie on the right side, without danger of immediate suffocation."

Mr. Hey found the patient in the state, just now described, on the 17th of September. "His face and especially his eyelid were a little swollen on the left side." The left side of the thorax was larger, than the right, and its integuments were œdematous. Upon pressing the intercostal muscles, they felt distended; they yielded a little to a strong pressure, but rebounded again. The abdomen, especially, at its upper part, appeared to be fuller, than in the natural state. (See *Hey's Practical Observations in Surgery*, *p.* 476.)

Another remarkable symptom, which is occasionally produced by collections of matter in the chest, is an alteration in the position of the heart. I have seen a patient in St. Bartholomew's hospital who had so large a quantity of matter in the left bag of the pleura, that it completely displaced the heart, which pulsated against the inside of the chest, at a considerable distance to the right of the sternum. This man's life might probably have been saved, had paracentesis thoracis been performed in time. Some suspected an aneurism from the throbbing on the right of the sternum; and the case was not fully understood till after death, when the body was opened. A little attention to the symptoms, however, might have convinced any man of moderate understanding, that it was an empyema, and that making an opening, for the discharge of the matter, afforded the only rational chance of preserving life. There had been pain and inflammation in the chest, followed by shiverings; there was very great difficulty of breathing; the heart, which previously used to beat in the usual place, no longer did so; but, now, pulsated on the right side of the thorax.

That the heart should be displaced in this manner by any large collection of fluid in the right cavity of the thorax, one would naturally expect; but, it is an occurrence, that has not been much noticed by surgical writers. M. Larrey, however, has related a highly interesting case, in which it happened. Indeed, not only was the heart pushed considerably to the right of the sternum, but, its action was so much impeded by the derangement of its position, that the pulse in the large arteries was thereby rendered extremely feeble. In this instance, also, the diaphragm had descended so low down, as to force some of the small intestines into the cavity of the pelvis. (See *Larrey's Mémoires de Chirurgie Militaire*, *Tom.* 3, *p.* 447, *&c.*) Pelletan has also recorded an example, in which a collection of fluid in the left cavity of the chest displaced the heart, the pulsations of which were perceptible betwixt the third and fourth ribs, of the right side, near the sternum. (*Pelletan's Clinique Chirurgicale*, *Tom.* 3, *p.* 276.)

The symptoms of empyema are frequently very equivocal, and the existence of the disease is generally somewhat doubtful. Panarolius opened a man, whose left lung was destroyed, at the same time that the thorax contained a considerable quantity of pus. Although the patient had been ill for two months, he had suffered no difficulty of breathing, and had had only a slight cough. Le Dran met with a case of nearly the same kind. A patient, who had been, for three days, affected with a considerable oppression, and an acute pain on the left side of the chest, got somewhat better. He felt no material difficulty of breathing, on whatever side he lay. The only thing, which he complained of, was a sense of a fluctuation in his thorax, and a little obstruction of his respiration, when he was in a

sitting posture. These symptoms did not seem sufficiently decided to justify the operation, and it was delayed. The febrile symptoms continued with cold sweats, and the patient died on the eighth day. Five pints of pus, were found collected in the chest. (See *Le Dran's Observations in Surgery, p*, 109, 110, *Edit.* 2.)

As the operation of empyema, and some other particulars, relating to this subject, are treated of in another part of this Dictionary, (See *Paracentesis of the Thorax.*) it will only be necessary for me here to subjoin a list of works, which may be advantageously consulted for information on empyema. *Sharp's Critical Enquiry into the Present State of Surgery, sect. on Empyema. Le Dran's Observations in Surgery. Petit's Traité des Maladies Chirurgicales, Tom.* 1, *Chap.* 3, *Des Plaies de Poitrine. Warner's Cases in Surgery, Chap.* 6, *Edit.* 4. *Mémoire sur l'Opération du Trépan au Sternum par M. de la Martiniére in Mém. de l'Acad. Royale de Chirurgie, Tom.* 12, *p.* 342, *Edit. in* 12*mo. Sabatier's Médecine Opératoire, Tom.* 2, *p.* 247, *&c. Edit.* 1. *Richerand's Nosographie Chirurgicale, Tom.* 4, *sect. des Maladies de l'Appareil respiratoire. Levéillé, Nouvelle Doctrine Chirurgicale, Tom.* 2, *p.* 575, *&c. Hey's Practical Observations in Surgery. Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 122, *&c. Larrey, Mémoires de Chirurgie Militaire, Tom.* 3, *p.* 442, *&c. Pelletan, Clinique Chirurgicale, Tom.* 3, *p.* 236, &c.

ENCANTHIS. (from ἐν, and κανθος, the angle of the eye.)

The encanthis, at its commencement, is nothing more, says Scarpa, than a small, soft, red, and sometimes rather livid, excrescence, which grows from the caruncula lachrymalis, and, at the same time, from the neighbouring semilunar fold of the conjunctiva. The inveterate encanthis is ordinarily of a very considerable magnitude; its roots extend beyond the caruncula lachrymalis, and semilunar fold, to the membranous lining of one, or both eyelids. The patient experiences very serious inconvenience from its origin, and interposition between the commissure of the eyelids, which it necessarily keeps asunder, on the side towards the nose.

The encanthis keeps up a chronic ophthalmy, impedes the action of the eyelids, and prevents in particular the complete closure of the eye. Besides, partly by compressing, and partly by displacing the orifices of the puncta lachrymalia, it obstructs the free passage of the tears into the nose.

This excrescence, on its first appearance, (continues this eminent writer,) is commonly granulated, like a mulberry, or is of a ragged, and fringed structure. Afterwards, when it has acquired a certain size, one part of it represents a granulated tumour, while the rest appears like a smooth, whitish, or ash-coloured substance, streaked with varicose vessels, sometimes advancing as far over the conjunctiva, covering the side of the eye next to the nose, as where the cornea and sclerotica unite. In this advanced state, the encanthis constantly interests the caruncula lachrymalis, the semilunar fold, and the membranous lining of one, or both eyelids. In addition to the roots, which in such circumstances connect the excrescence with the caruncula lachrymalis, the semilunar fold, and the conjunctiva of the globe of the eye, the encanthis emits an appendage, or prominent, firm elongation, along the inside of the upper, or lower eyelid, in the direction of its edge. The middle, or body, of the encanthis divides near the cornea, as it were, like a swallow's tail, to form two appendages, or elongations, one of which extends along the inner surface of the upper eyelid by the margin of which it is covered, while the other shoots, in a direction from the internal towards the external angle, along the inside of the lower eyelid, which also conceals it beneath its edge.

The body of the encanthis, or that middle portion of the whole excrescence, which reaches, from the caruncula lachrymalis and semilunar fold, inclusively, over the conjunctiva almost to the junction of the sclerotica with the cornea, sometimes forms a prominence, as large as a small nut, or chesnut. At other times, it is of considerable size, but depressed, and broken down, as it were, at its centre. Still, however, the body of the encanthis preserves that granulated appearance, which prevailed at first; while one, or both the appendages, on the inside of the eyelids, appear rather like a lippomatous, than a granulated substance.

On turning out the inside of the eyelids, these appendages, or elongations of the encanthis, form a prominence projecting forward. When both eyelids are equally affected, and turned inside out, the lippomatous appendages conjointly represent, as it were, a ring, the back of which rests on the globe of the eye.

Fabr. Hildanus was acquainted with this disease, which he treated with success, and named, *ficus scirrhosus ad majorem oculi canthum.* (*Cent.* 1. *Obs.* 2.)

However, in the case related by Hildanus, the encanthis seems only to have had one appendage, situated on the inner surface of the upper eyelid, below its edge.

Sometimes, as is noticed on the subject of the pterygium, the encanthis assumes a cancerous malignancy. This character is evinced by the dull red, and, as it were, leaden colour of the excrescence; by its

exceeding hardness, and the lancinating pains, which occur in it, and extend to the forehead, the whole eye-ball, and the temple, especially, when the tumour has been slightly touched. It is, also, evinced by the propensity of the excrescence to bleed, by the partial ulcerations on its surface, which emit a fungous substance, and a thin, and exceedingly acrid discharge. This maliguant species, or rather this degenerated state of the encanthis, only admits of palliative treatment; unless, indeed, an effort be made to extirpate it entirely, together with the whole of what is contained in the orbit, and, even then, the event is very dubious.

The benign encanthis, how large soever it may be, is always curable by extirpation. Those instances, which are small, incipient, and granulated, like a mulberry, or of a fringed structure, which originate either from the caruncula lachrymalis, or the semilunar fold of the conjunctiva, or from both these parts together, and even in part from the internal commissure of the eyelids, may be raised by means of a pair of forceps, and cut off from the whole of their origin, closely to their base, with the curved scissars with convex edges. In the performance of this operation, it is unnecessary to introduce a needle and thread through this little excrescence, as some are wont to do, for the purpose of raising it, and destroying more accurately all its origins, and adhesions. The same object is fulfilled by means of forceps, without inconveniencing the patient with a puncture of this kind, and drawing a thread through the part, in order to make a noose. However, in cutting out an encanthis of this small size, care should be taken not to remove, together with that portion of the excrescence which originates from the caruncula lachrymalis, any more of this latter body, than what is absolutely necessary for the precise eradication of the disease, in order that no irremediable weeping may be occasioned.

When the little excrescence has been detached from all its roots, says Scarpa, the eye must be washed several times with cold water in order to cleanse it from the blood, and then it is to be covered with a piece of fine linen, and a retentive bandage. On the 5th, 6th, or 7th day, the inflammation arising from the operation entirely ceases, and the suppuration from the wound is accompanied with the mucous appearance already described. The little wounds are then to be touched with a piece of alum, scraped to a point like a crayon, and the vitriolic collyrium, containing the mucilage of quince-seeds, is to be injected into the eye in question several times a day. If these means should not bring about the wished-for cicatrization; but, on the contrary, the small wounds situated on the caruncula, and internal commissure of the eye-lids, should become stationary, and covered with proud-flesh, the argentum nitratum ought to be applied to them. The conjunctiva, however, should be avoided as much as possible, especially, if at all wounded. When the fungous granulations have been destroyed, the cure may be perfected by the collyrium already-mentioned, or rather by introducing, thrice a day, between the eye-ball and internal angle of the eye-lids, the powder of tutty, and the armenian bole. Bidloo extols very much powdered chalk, either alone, or in conjunction with burnt alum. (*Exercit. Anat. Chir. Decad.* 2.)

Excision is equally applicable to the inveterate encanthis, which is of considerable size, and broken down at its body, or which forms a prominence, as large as a nut, or chesnut, with two lippomatous appendages extending along the inner surface of one, or both eye-lids. The application of a ligature to such an excrescence ought never to be regarded as a method of cure; for, the large, inveterate encanthis never has a sufficiently narrow neck to admit of being tied. On the contrary, when the tumour is voluminous, its roots, invariably, extend to the caruncula lachrymalis, the semilunar fold, and the conjunctiva covering the eye-ball, oftentimes, nearly as far as the cornea. In this state, also, the encanthis has one, or two lippomatous appendages, which reach along the membranous lining of one, or both eye-lids. Hence, though the ligature were to produce a separation of the body of the encanthis, one, or both the lippomatous appendages would still remain to be extirpated. This second operation could only be accomplished by the knife. In this disease, there is no foundation for the fear of hemorrhage, to which the advocates for the ligature attach so much importance; for, cases are recorded of considerable, inveterate encanthes being removed, without the least untoward occurrence from loss of blood. To these, Scarpa observes, he could add a great number of his own, so that no doubt can now be entertained on this point.

Pellier relates a case, in which an encanthis was followed by a dangerous hemorrhage, though it had been cut out by an expert oculist. He enters, however, into no detail concerning the nature of the complaint, nor the way, in which the operation was performed; circumstances from which one might deduce the reason of an unusual accident. Indeed, the same author adds, "I have often performed this operation for such excrescences, and have never met with a similar occurrence." (*Recueil d'Observ. sur les Maladies de l'Œil, Part* 2. *Obs.* 118.)

In the above-mentioned case of a large, inveterate encanthis, with only one elongation on the inside of the upper eye-lid, as soon as Fabricius Hildanus had taken hold of the body of the tumour with a hook, and drawn it towards him, he turned out the inside of the eye-lid, so that the lippomatous appendage was made to project through its whole extent. Then he dissected this production away by means of a small bistoury, and, continuing the incision, he entirely detached the body of the encanthis from the conjunctiva covering the eye-ball, from the semilunar fold, and from the caruncula lachrymalis. The operation was followed by the most complete success, and ought to serve as a model, and guide, to all surgeons, who have occasion to treat this disease.

When the encanthis is large, and inveterate, with two large lippomatous elongations, one on the inside of the upper eye-lid, and the other on that of the lower one, we are to proceed in the following manner. The patient being seated, an assistant is to turn out the inside of the upper eye-lid, so as to make one of the appendages of the encanthis project outward. By means of a small bistoury, a deep incision is next to be made into the elongation, in the direction of the margin of the eye-lid; and then having taken hold of, and drawn it forwards with a pair of forceps, we are to separate it, throughout its whole length, from the inside of the upper eye-lid, proceeding from the external, towards the internal angle of the eye, as far as the body, or middle of the encanthis. We are then to do the same to the lippomatous appendage on the inside of the lower eye-lid. Afterwards the body of the encanthis is to be elevated, if possible, with a pair of forceps; but when this instrument will not answer the purpose, a double hook must be employed. This middle portion is now to be detached, partly by the bistoury, and partly by the curved scissars from the subjacent conjunctiva, on the globe of the eye, from the semilunar fold, and from the caruncula lachrymalis; dividing the substance of this last part more, or less deeply, according to the depth and hardness of the large, inveterate encanthis. Here it is proper to state distinctly, that when we have to deal with an old, large tumour of this nature, that is deeply rooted in the caruncula lachrymalis, it is not regularly in our power to preserve a sufficient quantity of the substance of this part, to prevent the tears from dropping over the cheek, after the wound is healed.

The eye is to be repeatedly washed with cold water.

The rest of the treatment, consequent to the extirpation of a large encanthis, is almost the same as what was explained in speaking of the small incipient one. Bathing the eye very frequently in the lotion of mallows, and employing anodyne, detergent collyria, are the best local means, until the mucous appearance, preceding suppuration, has taken place on the surface of the wound. Then we may have recourse to mild astringent ointments and collyria. The mildest topical applications are generally the best, both in the first stage of suppuration, as well as afterwards, particularly, when, together with the encanthis, we have removed a considerable piece of the conjunctiva, which covered the eye-ball towards the nose, and was intimately connected with the body of the excrescence.

The following case related by Marchetti, will throw additional light on the contents of this chapter. *Curavi quemdam canonicum Polonum laborantem meliceride magnitudinis jujubæ, quæ à carunculâ anguli majoris oculi ad totam pupillam porrigebatur. A multis tentata curatio medicamentis, decoctis scilicet, collyriis, et aliis hujusmodi; omnia tamen octo mensium spatio incassùm adhibita. Cùm verò me consuluisset, ipsum tumorem evellendum censui; quod cùm reformidaret, spe tamen salutis operationem admisit, quam statim molitus sum, corpore priùs expurgato accuratissimè, ab aliis medicis. Paravi itaque hamulum, quo ipsam meliceridem perforavi, et manu apprehendi, alterâ verò forcipe eamdem cum folliculo sectione separavi tum à carunculâ, tum à tunicâ adnatâ, et ipsâ pupillâ; atque ita totum tumorem eduxi sine ullâ offensa ipsius oculi; à quibus statim applicui gossypium imbutum aquâ rosaceâ cum ovi albumine agitatâ, et portiunculâ croci, patiente tres dies hoc modo fasciâ vincto; adhibito postmodum collyrio cum aquâ rosarum, et pulvere tutiæ præparatæ; quibus spatio octo dierum omnino convaluit æger; increpantelicèt meam præceptore meo ab Aquapendente audaciam; cùm tamen brevi spatio temporis id præstiterim, quod alii medici non potuerunt perficere: idque præsentibus præclarissimo Joanne Dominico Sala cum multis studiosis.* (*Obs. Med. Chir. Sylloge, obs.* 21.)

The preceding account is taken from *Scarpa sulle Malattie degli Occhi.* I know of no better work, to which I can refer the reader. They who understand German, however, may peruse Richter's remarks on the subject, in his *Anfangsgr. der Wundarzn. Band.* 2, *p.* 473, *&c. Edit.* 1802. He is doubtless one of the best writers on the diseases of the eye in general.

ENCEPHALOCELE. (from εγκεφαλος, the brain, and κηλη, a tumour.) A hernia of the brain. (See *Hernia Cerebri.*)

ENCYSTED TUMOURS. (See *Tumours Encysted.*)

ENEMA. (from ενημι, to inject.) A glyster.

The following are some of the most useful glysters, employed in the practice of surgery.

Cathartic.

℞. Decocti Hordei ℔j.
Salis Muriatici ʒj.—Misce.

℞. Decocti Avenæ ℔j.
Olei Olivæ ʒij.
Magnesiæ vitriolatæ ʒj.—Misce.

Anodyne.

℞. Mucilaginis Amyli, Aquæ distillatæ sing. ʒij. Tincturæ Opii guttas XL.—Misce.

℞. Olei Olivæ ʒiv. Tincturæ Opii guttas XL.—Misce.

The two latter glysters are particularly useful in cases in which there is great irritation about the rectum, bladder, or urethra. They have great effect in diminishing spasmodic affections of this canal and the neck of the bladder.

Tobacco,

Employed in cases of strangulated Hernia.

℞. Nicotianæ ʒj. Aq. ferventis ℔j. The plant is to be macerated ten minutes, and the liquor then strained for use. One half should be first injected, and soon afterwards the other, unless the glyster should operate with dangerous violence, as it sometimes does in particular constitutions.

ENTEROCELE. (from ἔντερα, the bowels, and κηλη, a tumour.) A species of hernia, in which the contents of the tumour are intestine.

ENTERO-EPIPLOCELE. (from ἔντερα, the bowels, επιπλοον, the omentum, and κηλη, a tumour.) A species of hernia, in which the contents of the swelling are composed both of intestine and omentum.

ENTERO-HYDROCELE. (from ἔντερα, the bowels, and ὑδροκηλη, a dropsy of the scrotum.) This must mean a common scrotal rupture, with a good deal of water in the hernial sac; or else a *congenital hernia*, (in which the bowels descend into the tunica vaginalis testis,) attended with a collection of fluid in the cavity of this membrane.

ENTEROMPHALOS. (from ἔντερα, the intestines, and ομφαλος, the navel.) A hernia at the navel, formed by a protrusion of intestine.

ENTERORAPHE. (from ἔντερα, the intestines, and ραφη, a suture.) A suture of the intestines.

ENTEROSCHEOCELE. (from ἔντερα, the intestines, and οσχεοκηλη, a hernia in the scrotum.) Such a case in which the protruded parts are intestine.

ENTROPIUM. (from εν and τρεπω, to turn.) An inversion of the eyelids. (See *Trichiasis.*)

EPIGLOTTIS SHOT AWAY. The practice of M. Larrey furnishes a curious example, in which the epiglottis of a French soldier was shot off at the battle of Alexandria, on the 21st. of March, 1801. The ball entered at the angle of the jaw, crossed the throat obliquely, and came out at the opposite side of the neck. The base of the tongue was grazed, and the epiglottis shot away; the patient spit it up after the accident, and shewed it to the surgeon, who first saw him. One will be convinced of the fact by an account of the symptoms.

The patient was not in much pain; but, his voice was hoarse, feeble, and scarcely audible.

When he first attempted to swallow, he was seized with a convulsive suffocating cough, attended with vomiting. Annoyed by thirst, which the extreme heat of the weather and the irritation of the wound excited, he incessantly repeated the attempts to drink; but, always with the same result. Four days were passed in this deplorable condition. He already experienced violent complaints at his stomach; continual loss of sleep; he had a small accelerated pulse; and was beginning to look thin.

Such was the state of this wounded soldier, when M. Larrey saw him on the fifth day. After making a few enquiries about what had passed after the accident, attempting to make the patient drink, and examining the interior of the mouth, M. Larrey was convinced, that the paroxysms of suffocation, and the inability to swallow depended upon the permanent opening of the glottis, the lid of which had been shot away. The prognosis of the injury was exceedingly unfavourable, and there can be no doubt, that, if the patient had been abandoned to the resources of nature, he would have died in the course of a few days. The indications were equally difficult to fulfil: the most urgent was to appease the hunger and thirst, with which this poor soldier was afflicted. M. Larrey, very fortunately, was provided with an elastic gum tube, constructed for the œsophagus. This instrument was introduced with the usual precautions, into the pharynx, and by means of it, the patient was given some drink, which relieved him much, and afterwards some rich broth. The patient was fed in this manner for six weeks, at the end of which time, he was able, without the assistance of the tube, to swallow thick panado, and thickened rice, made into little balls. The powers of speech and deglutition in time became much more perfect; in consequence, as M. Larrey imagines, of an enlargement of the arytenoid cartilages, and an expansion of that part of the base of the tongue which lies next to the glottis, having formed a sort of substitute for the epiglottis. (See *Larrey's Mémoires de Chirurgie Militaire, Tom.* 2, *p.* 145—149.)

The foregoing case illustrates, in a convincing manner, the importance and

utility of elastic-gum tubes for conveying nourishment and medicines down the œsophagus in wounds about the throat. All practitioners, and, especially, military surgeons, should be duly impressed with the necessity of having such an instrument always at hand. The patient, whose case is above recited, owed his preservation altogether to this means, without which he must have been starved to death.

EPIPHORA. (from επιφερω, to carry with force.) By this term is meant an accumulation of tears on the anterior part of the eye; in consequence of which, the person afflicted is not only under the necessity of frequently wiping them away, but vision is injured by the morbid refraction, which they produce in the rays of light that enter the pupil. The disease may arise from a more copious secretion of tears than the puncta lachrymalia can absorb, or, as is most common, from an obstruction in the lachrymal canal, in consequence of which the tears are prevented from passing freely from the eye into the nose. *Ware on the Epiphora, or Watery Eye.* (See *Fistula Lachrymalis.*)

EPIPLOCELE. (from επιπλοον, the omentum, and κηλη, a tumour.) A hernia, formed by a protrusion of a piece of the omentum. (See *Hernia.*)

EPIPLOOMPHALON. (from επιπλοον, the omentum, and ομφαλος, the navel.) An omental hernia, protruding at the navel.

EPIPLOSCHEOCELE. (from επιπλοον, the omentum, οσχεον, the scrotum, and κηλη, a tumour.) An epiplocele, or omental hernia in the scrotum.

EPISTHOTONOS. (from επισθω, forwards, and τεινω, to extend.) A spasm, by which the body is drawn forwards.

EPULIS. (from επι, upon, and ουλα, the gums.) A small tubercle on the gums. It is said sometimes to become cancerous. The best plan of cure is to extirpate it with a knife.

EPULOTICS. (from επουλοω, to cicatrize.) Applications conducive to the healing of wounds.

ERETHISMUS. (from ερεθιζω, to irritate.) Any thing which causes irritation. Mr. Pearson has described a state of the constitution, produced by mercury acting on it as a poison. He calls it the *mercurial erethismus*, and mentions, that it is characterized by great depression of strength, anxiety about the præcordia, irregular action of the heart, frequent sighing, trembling, a small, quick, sometimes intermitting pulse, occasional vomiting, a pale contracted countenance, a sense of coldness; but the tongue is seldom furred, nor are the vital and natural functions much disturbed. In this state, any sudden exertion will sometimes prove fatal. Mr. Pearson advises, with a view of preventing the dangerous tendency of this affection, the immediate discontinuance of the use of mercury; and exposing the patient to a dry cool air. The incipient erethismus may often be averted by the camphor mixture with large doses of the volatile alkali, if mercury be also left off. Sarsaparilla is also beneficial, when the stomach will bear it. (*Pearson on Lues Venerea, page* 156, *&c. Edit.* 2.)

EROSION. (from *erodo*, to knaw off.) *Erosio.* This word is very often used by surgical authors in the same sense as ulceration; viz. the formation of a breach, or chasm, in the substance of parts, by the action of the absorbents.

ERYSIPELAS. (from ερυω, to draw, and πελας, adjoining.) St. Anthony's fire; so called, from its tendency to draw the neighbouring parts into the same state, or, in other words, from its propensity to spread.

Erysipelas may be defined to be an inflammatory, cutaneous, and trivially elevated swelling, that is attended with redness, which disappears, and leaves a white spot for a short time after being touched with the end of the finger, and the affection is characterized by a remarkable propensity to spread with rapidity to a large extent.

In this definition, we have adopted the opinion of medical and surgical writers, who have generally agreed to arrange erysipelas in the class of inflammatory complaints. However, though the affection may have such relations with the latter disorders, as will not allow it to be considered as a positively separate species of disease, yet, if its symptoms be investigated with care, it will be found, that these relations are sufficiently remote to make erysipelas and phlegmon be regarded as two very distinct kinds of inflammation. It has been thought, that the principal difference, existing between the two affections, consisted in the situation which was peculiar to each; erysipelas commonly affecting the surface of the skin, which is very irritable, while phlegmon is situated more deeply in the very substance of parts. It will presently be seen, that this explanation is not sufficient to account for the very different symptoms, which belong to the two affections.

It is observed in the Parisian Chirurgical Journal, that the history of Erysipelas becomes an important consideration, when we reflect, that the disease is extremely common, and that its treatment by many practitioners is purely prejudiced and empirical.

The Greeks admitting in their theories of medicines the metaphysical principles of philosophy, and the superstitious ideas of the Pythagoreans, respecting numbers, agreed in the existence of four elements,

four radical qualities, four temperaments, and consequently four humours and four species of tumours, produced by stagnation, or a diseased alteration of the humours above-mentioned.

Phlegmon, according to their theory, was formed by the blood, erysipelas by the bilious, œdema by the pituitous, and scirrhus by the melancholic or atrabilious temperament. But as this theory was often contradicted by observation, they were obliged to have recourse to the supposition of a mixture of the humours, by means of which tumours of a mixed description were formed; whence, no doubt, we derive the distinction of simple or true erysipelas, (produced merely by extravasation and deposit of the bilious humour under the skin:) from the compound or spurious, which took its name from the humour at the time most prevalent; hence the names of phlegmonous, œdematous, scirrhous, erysipelas, &c.

Such is Galen's idea of this disease, and which has been repeated by almost all subsequent authors who have written on the subject of tumours. The celebrated La Motte, who criticised this theory in different parts of his work, did not dare to ridicule it openly.

Erysipelas, in general, is an inflammatory superficial swelling, not circumscribed, accompanied with lively heat and pungent pain. The whole extent of the part affected is of a bright red colour, clear and shining. This appearance subsides on pressing the part with the finger, and returns when the pressure is taken off. These characteristic marks agree with all the different sorts of erysipelas, but are variously marked, according to the different species.

The first, and most simple, is that mentioned by Sauvages in his Nosology, and Cullen in his First Lines, under the term of Erythema, from a word employed by Hippocrates in his Aphorisms, and in his Coacæ Prænotiones et Epidemicæ, to signify all the different species of erysipelatous affections.

But this word is not in general use, nor has it by any means a determinate signification: it appeared to Desault, that the general name of *bilious erysipelas*, employed by many authors, would be more eligible.

In this kind of erysipelas, the swelling is trifling, and often insensible, the skin of a rose-colour, generally a little verging towards yellow. The sensation, that the patient experiences, is neither tension nor pulsation, but a painful smarting, similar to what results from the application of hot water, or from exposure to the rays of the sun.

Towards the period of the invasion of this disease, and often many days before, the appetite is lost, the mouth is bitter, the tongue moist, and covered with a yellow mucus. Nausea and sometimes bilious vomitings come on. The patient becomes weak and dejected, and is affected with wandering pains and considerable heat, without any particular dryness of the skin or violent sense of thirst. Sometimes the disease begins with fever, more or less violent, preceded by shivering and violent pain in the head.

In the *phlegmonous erysipelas*, the skin is more raised than in the preceding species, the swelling harder and deeper, and of a deeper colour. There is generally a slight degree of tension of the integuments, with pungent pain, and at intervals pulsatory. On the first days of the attack of this disease, there is neither bitterness in the mouth nor nausea, the skin and tongue become dry, and are accompanied with a violent sense of thirst; the pulse is full and hard, indicating plethora.

At the expiration of a few days, particularly when the disease has been treated by bleeding and an antiphlogistic regimen, the tongue becomes foul and moist at its edges, bitterness of the mouth and nausea supervene, and the disease, in its progress, offers nothing to distinguish it from bilious erysipelas.

All the different kinds of erysipelas, says Desault, may be classed under these two heads, and we may judge from the state of the primæ viæ under what class they should be arranged. There is, however, a species of erysipelas different from the rest, that requires local treatment, though the symptoms are by no means extraordinary. The species we allude to is consequent to wounds, contusions, &c.

The danger of every species of erysipelas is proportioned to its extent, to its intensity, and to the part affected; but the most dangerous of all is that which affects the head and the adjacent parts. This remark has been repeated, after Galen, by Ætius, Paulus Eginetus, Oribasius, &c. These authors are even apprehensive, that, in such cases, suffocation may take place, from an obstruction in the respiratory passages.

Hippocrates has formed an unfavourable prognostic of the erysipelas which disappears suddenly from the surface of the body, to affect the internal parts. (*Desault's Parisian Chirurgical Journal, Vol.* 2, *p.* 24—28.)

The following is a description of erysipelas, as it sometimes appears when it attacks the head.

The attack often takes place in a sudden manner, either with or without fever; but it is also frequently preceded by shiverings, complaints about the region of the heart, and other symptoms very similar to those which indicate the approach of an intermittent fever. The heat is often ac-

companied with a little delirium, and almost always with drowsiness of a more or less evident kind. A swelling afterwards makes its appearance, attacking the forehead, the cheeks, the nose, or eye-lids. This swelling is elastic and smooth; but it is not distinctly circumscribed, and it gradually spreads over such parts of the face as were not at first affected. The skin of the part affected becomes of a bright red colour, occasionally having a tendency to a livid hue, in other instances having a mixture of yellow. These colours disappear when pressure is made on the part affected, but very soon reappear when such pressure is discontinued. The patient experiences a burning heat, and a disagreeable pricking in the part, rather than any acute pain: sometimes he complains of a very troublesome itching. The surface of the tumour is shining, and, as it were semi-transparent: but without hardness, tension, or any sensation of throbbing. The eye-lids are often so swollen that the patient cannot see, and the whole countenance is exceedingly disfigured. Small vesicles arise over a more or less extensive part of the erysipelatous tumour, and they are filled with a transparent serous fluid, and bear a great resemblance to those which are occasioned by boiling water. When such vesicles burst, the fluid which is discharged, sometimes excoriates the neighbouring parts. Very frequently, there is even a slight ulceration at the base of these vesicles, which ulceration, in the worst sort of cases, assumes a gangrenous appearance, and falls rapidly into a state of complete mortification. When the disease takes a favourable course, the fever, which till now has continued, begins to abate; the vesicles dry up; and, at the end of an interval of eight or twelve days, the cuticle peels off. The degree of danger depends materially on the delirium and other symptoms indicating an affection of the brain.

The seat of erysipelas seems to be under the cuticle, in the rete mucosum; but it is not confined to this part, as the cellular membrane is always affected even in a considerable degree. The affection of this membrane, however, is very different from what happens in phlegmonous inflammation. In a genuine case of erysipelas, healthy pus is very rarely found enclosed in a circumscribed cavity; and when there is any secretion of purulent matter, a feel is communicated, on compressing the part, almost like that which a sponge would give. In such cases, the cellular substance has suffered considerably, and the part is frequently attacked by gangrene.

It is not easy to determine the causes which give rise to this complaint. There are a great many which, in conjunction with concomitant circumstances, manifestly contribute, in many cases, to the production of the disorder. Such are in particular:

1. Violent passions, such as anger, acute grief, &c.
2. Exposure to the heat of the sun, or that of the fire, too long continued.
3. The impression of cold damp air.
4. The action of various vegetable, mineral, and animal poisons.
5. Wounds, contusions, fractures, &c.

There is no doubt, that erysipelas is, for the most part, intimately dependent on the state of the constitution. Persons in the habit of drunkenness, and other kinds of intemperance, and who, in a state of intoxication, meet with local injuries, often have erysipelatous inflammation in consequence of them. Other subjects, who lead more regular lives, experience, when they meet with similar injuries, healthy phlegmonous inflammation.

The opinion of Hippocrates and Galen, with respect to the origin of this disorder from a congestion of the bile, is universally known to all initiated in the profession of surgery. This old doctrine has been, in some measure, revived by Tissot, and many other believers in the humoral pathology, who attribute the cause of erysipelas to an acrid humour, commonly a bilious one, diffused through the mass of the blood. But, much as I despise the absurdity of this theory, observation obliges me to confess, that the complaint seems frequently to be connected with a wrong state of the chylopoietic viscera, and, probably, with a morbid state of the bilious secretion in particular. A sudden suppression of perspiration, by exposure to cold and damp, or other more obscure causes, is set down by every writer on the subject, as frequently having a great share in exciting, and keeping up, erysipelatous affections.

A further proof, that erysipelas is mostly dependent on constitutional causes, is that the affection most frequently happens in autumn, or in any season, when hot weather is succeeded by cold and wet.

After what has been said, the characters, which distinguish erysipelas from phlegmon, may be taken notice of.

1. The inflammatory swelling, which takes place in the former, is not so elevated as in the latter, and is never plainly circumscribed.
2. In most cases, the surface of the skin seems as if it were burnt.
3. The redness, though of a bright description, disappears on pressure.
4. The sense of throbbing, and darting pain, attendant on phlegmon, is not observable.
5. The inflamed part is free from ten-

sion, and appears as if it were affected with œdema, or rather with emphysema; only one can perceive no crepitation.

As we have already remarked, however, it must not be inferred from these differences, that erysipelas is to be considered as a disease essentially distinct from those, which are called inflammatory, as it has some characters in which it manifestly approaches them. Like phlegmonous inflammations, it may be excited by any local irritation. Like other inflammations, it may end in suppuration, though of a less perfect sort, than that in which phlegmon ends, and rarely contained in a circumscribed cavity. The pulse, in this disease, as well as in others of the same class, is frequent, hard, sometimes full; and when the patients are bled, their blood has the same appearance, and is covered with the same kind of inflammatory crust, as blood taken away in other kinds of inflammation.

It is proper, however, to notice, that practitioners are not universally agreed with respect to the nature of the pulse in erysipelas: it is, according to some, particularly Mr. Pearson, soft, frequent, and often irregular. But, if due attention be paid, this difference will be found to depend on particular circumstances. In the *phlegmonous* erysipelas, the pulse will always be fuller, than in the bilious. In the impure air of hospitals, and in all places, where the air is impregnated with carbonic acid gas, and other noxious gases, we find, that various affections decidedly inflammatory, especially those which are attendant on wounds, affect the body, and the sanguiferous system in particular, in a very different manner from what is observed when the patients are living in a more salubrious air. All inflammations assume a character more or less unfavourable, in consequence of the influence of bad air. This is particularly striking in cases of erysipelas. In such instances, living in an impure atmosphere has a singular effect in augmenting the sense of weakness and dejection, which patients always experience in a certain degree, and, in these cases, it may even go so far as to produce a total alteration of the state of the pulse. But, if attention be paid to the disease in a situation where the atmosphere is not impregnated with putrid effluvia, it will be found to put on a very different shape. The symptoms of dejection, of nervous irritation, and of the brain being affected, are much less conspicuous; and the state of the pulse, especially in patients who have not been previously debilitated by other diseases, bears a great resemblance to that which takes place in an inflammation of the chest.

We have also to remark, that, besides bad air, many other circumstances, which do not even belong to the nature of erysipelas, may have a share in producing an alteration of its symptoms. Thus, while inflammations of another kind, such as pleurisy and acute rheumatism, particularly affect robust persons, in whom the vital principle exists with a great deal of energy, erysipelas is prone to attack persons who are aged, or of delicate and depraved constitutions. The latter is also seen making its appearance as a symptom, in weakened parts, which have in a certain degree been deprived of their tone, as is the case with œdematous parts. It is not surprising, that, in these different cases, in which the tone of the system has already suffered, the state of the pulse, in persons affected with erysipelas, should seem different from what it is in individuals, who are more healthy and robust.

I confess, that I prefer the division of erysipelas into the *phlegmonous*, *bilious*, and *local*, from wounds, &c. as adopted by Desault. By some other writers, the disease has been distinguished into the *acute erysipelas*, the *œdematous erysipelas*, and the *malignant* or *gangrenous erysipelas*. These three species, which are strictly only different degrees of one same disease, or varieties produced by the particular circumstances, in which the patient is placed, may be either symptomatic, or idiopathic.

The *acute erysipelas* is mostly met with in persons of a sanguineous and choleric temperament; it makes its attack suddenly, and is very apt to affect the face. The pulse is always frequent, and most commonly full and hard. All the other general symptoms of inflammation are observable. These subside a little when the erysipelas has completely formed, though they often increase during the first periods of the swelling. The heat of the part affected is very great; the skin is of a brighter red colour than it is in the other kinds of erysipelas; vesicles form on the surface of the swelling, but they are less numerous, and more distinct, than those originating in the other species of this complaint. In the acute erysipelas, the inflammation is seldom followed by suppuration, except just at the edges of the eyelids, and the disease speedily terminates, sometimes in three or four days. The part affected changes its colour, and becomes yellowish; and the cuticle separates in small scales. The whole scalp is often affected with a painful sensibility, which even continues a long while after the disease is entirely at an end.

The acute erysipelas is often idiopathic. It is sometimes observed to attack the same person periodically, at certain times of the year. It is also very frequently a consequence of wounds, &c.

The attack of the *œdematous erysipelas* is neither so sudden, nor so violent, as that of the preceding kind. The swelling increases more gradually; it spreads to a greater extent; the heat is less ardent; the inflammatory symptoms are less evident; the pulse is not so hard, and the strength is more depressed. The symptoms of the brain being affected are more alarming. The colour of the skin is, in this case, much deeper, and intermingled with yellow and brown; the vesicles are small and numerous; and when the part affected has been exposed a few days to the air, it becomes covered with a brown dark-coloured scab, which somewhat resembles the one which occurs in the confluent small-pox.

This sort of erysipelas is far more uncommon than the foregoing one, and is much more dangerous. The patients often are in a state of delirium, or rather of lethargy, on the seventh, ninth, or eleventh day, or sometimes a little later. It is chiefly in hospitals that the disorder occurs, often appearing there to be epidemic, though it cannot be said to be ever contagious. It is particularly prone to attack persons weakened by age or intemperance, children, and dropsical subjects. When the œdematous erysipelas makes its appearance, as a symptom of some other affection, it is not nearly so dangerous as when idiopathic. It is always, however, to be considered as a serious malady, whatever may be its occasional cause. It is more apt, than the acute erysipelas, to shift its situation from the surface of the body to the internal parts. It is also seen affecting one leg, and then the other, several times in the course of one indisposition. When the brain becomes affected in this manner, delirium, and other most alarming symptoms, are immediately excited.

The *gangrenous erysipelas* bears a considerable resemblance to the preceding kind, in regard to the symptoms, with which it makes its attack; but it is much more rapid in its progress. The swelling soon becomes covered with phlyctenæ, the basis of which is livid; and symptoms of gangrene, attended with a state of the pulse, similar to that which takes place in malignant fevers, are not long before they make their appearance. This species of erysipelas is very liable to occur on the face, shoulders, and chest. The danger, which attends it, is proportioned to the more or less vigorous state of the system: the case is often fatal, particularly when the disease attacks persons who have been already debilitated by other causes. When it terminates favourably, small cavities and sinuses are often found in the cellular substance, which contain pus of a bad quality. In this sort of case, one or more ulcers form externally, through which considerable sloughs of the cellular membrane are discharged.

When erysipelas in the legs terminates favourably, it generally leaves those parts more or less affected with an œdematous swelling, which it is often very difficult to cure.

TREATMENT OF ERYSIPELAS.

The treatment of erysipelas, as it is remarked in the Parisian Chirurgical Journal, has varied materially at the different periods of the medical art. Celsus recommended bleeding indiscriminately in every species when the strength would permit. Ætius, who founded his opinion on the authority of Galen, never employed the lancet, except in cases of manifest plethora: the bilious erysipelas he treated with purgatives. Paulus Æginetus, on the contrary, never exhibited them, but when, from some obstacle, he was prevented from ordering bleeding; a practice, which, like Galen, he recommended as a general precept. Oribasius recommends medicines proper for the evacuation of the bile. Avicenna, in adopting this last method, observes, that bleeding is rarely useful, sometimes hurtful; and, yet, at the same time, admits, that there are cases, in which it is indispensible. Actuarius has made nearly the same remarks as Avicenna, and, also, extends the use of purgatives to every species of inflammation. Guy de Chauliac, Thévenin, Munnick, Sydenham, &c. prescribe bleeding in all species of erysipelas, unless the affection is extremely slight. In this opinion they are followed by a crowd of moderns, some of whom, influenced by the inspection of the blood when it presents what they term a plethoric or inflammatory crust, order the bleeding to be repeated three or four times.

Thévenin sometimes prescribed a gentle emetic, but not till after other means had been unsuccessfully tried.

Paré has remarked, that the disease generally terminates by vomitings and bilious dejections; but at that time the emetic tartar was not in use; a medicine admirably calculated to accelerate this termination: and now, though the effects of this remedy are known, yet many practitioners are afraid to employ it. Stoll himself never prescribed it, without the patient being previously prepared.

Richter, the celebrated professor of Gottingen, and one of the most judicious German authors, recommends the exhibition of an emetic on the first attack of a bilious erysipelas. He admits that there are cases, though extremely rare, which require bleeding in the first instance.

Cullen proposes cooling purgatives in addition to these means, and coincides with the method employed by Sellé, who, viewing erysipelas as a species of putrid fever, joins to evacuants the use of bark, wine, and other antiseptics.

Bell treats this mode of practice, and the opinion on which it is founded, as purely hypothetical. He prefers the antiphlogistic regimen and bleeding, but by no means local, as it is generally productive of ulcers difficult to cure. The ancients appeared to attribute much efficacy to bleeding and the use of purgatives, and even still more to topical applications. Some recommend the use of diaphoretics and sudorifics; whilst others, and indeed the greatest number, prescribe relaxing, refreshing, and diuretic, drinks.

Alexander of Tralles, after the doctrine of Galen, prescribed only cold water to his patients. He recommended them to breathe fresh air, and to be slightly clothed; and observes, with great judgment, that this is the plan that nature seems to point out, and supports the propriety of this method by cases peculiar to himself.

Paré also attributed some advantage to fresh air, to which he joined the use of cooling medicines, &c. Sydenham, with the same views, prescribes the use of small beer. Others recommend red wine and water. Thévenin treats obstinate erysipelatous affections by means of baths, whey, veal-broth, and cold mineral waters.

Topical applications have been for a long time in general use for the cure of erysipelas; nevertheless, Hippocrates, who speaks frequently of this disease, and who relates many cases of this description in his epidemics, says nothing to induce a suspicion, that he ever had recourse to local applications. The practice of modern physicians has differed materially; they have been diffuse in the use of liniments, fomentations, poultices, and even ointments of every description. It was soon remarked, that oils, ointments, plasters, and all fatty substances, were pernicious in the treatment of erysipelas. Galen made this remark; which, however, did not prevent the use of the emp. diapalma dissolved in oil of roses. Fabricius Hildanus has seen the use of the oil of roses, continued for some days, produce gangrene, in a case of phlegmonous erysipelas. Munnick quotes this case, and Manget reports it at length. The medicaments of a benumbing and narcotic quality, recommended by Galen, Paulus Eginetus, and many others, have also tended to produce mortification.

Resolvents and repellents have been generally recommended. Authors, however, agree, that their application is not unattended with danger: for, independently of the fatal consequences not uncommonly apprehended from metastasis, it was objected, that induration or gangrene of the part affected might often be occasioned by their indiscriminate use. A conviction of the truth of this remark induced Paulus Eginetus to reject astringent and spirituous applications, and Avicenna to prefer the effusion of cold water on the part to more active applications. For the same reason, oxycrate, a boasted remedy among the Greeks, was preferred to weak solutions of lead, as recommended by Thévenin, and the different infusions of elder-flowers, melilot, and other similar plants, were even in more general use.

De Haen employed a decoction of elder-flowers in whey: sometimes emollients, as warm water, marshmallow-water, water of frogs spawn, &c.

Hartman attributes the most serious symptoms, and even mortification of the part itself, to this last application. Celsus used cataplasms covered with compresses, moistened with cold water. Galen rendered them resolutive by the addition of oxycrate. Paulus Eginetus recommended a poultice of barley-meal; Thévenin one made of rye boiled in lime-water; and Diembroeck one composed of bean-meal and oak-leaves reduced to a powder. But it is superfluous to dwell longer on methods which have proved inefficacious, and which have been long since abandoned.

Cullen, concurring in opinion with all accurate observers on the inutility and danger of every topical application, absolutely rejects them. He allows, however, the part affected to be sprinkled with powdered starch, (a practice of late years adopted in England,) to absorb, according to Mr. B. Bell, the acrid humour, which is furnished, and which tends to produce ulceration.

Without doubt, chalk has been employed by some practitioners to answer the same indications. (*V. J. Munnick, Chir. lib.* i. *Manget. Bibl.*)

B. Bell, who perfectly accords with Cullen, with respect to the injurious effects of local applications, yet permits a thin layer of the extract of Saturn to be applied to the part by means of a feather, when the pain is very acute.

Richter, so far from approving this practice, views the extract of Saturn in the same light as other astringents, which he observes, often produce fatal consequences. This learned professor, like Sellé, Stoll, and other skilful practitioners, makes use of no application whatever to the part. Actuarius observes, also, that local applications are useless in erysipelas, and that

the inflammation will subside by the use of cathartics alone.

Besides the means, which we have pointed out, there was one mentioned by Thévenin, which, during his time, was in very general use: this was the application of blisters. He proposed them with the view of evacuating, or at least diverting, the erysipelatous humour, when they were applied at a considerable distance from the part affected.

This recalls to our recollection a case mentioned by Alix, in his Observata Chirurgica, fasc. iii. where blisters were applied to the legs of a peasant, for a wandering and obstinate erysipelas, which had successively occupied the back, the thorax, and the face. The erysipelas attacked the feet, and was immediately followed with gangrene.

Such is the abridged history of what has been written on the subject of erysipelas. The means related for the cure of the disease may perhaps appear in some degree tedious; but they are more important to recollect, than theoretical distinctions of the various species of erysipelas.

Desault may be regarded as having adopted the most judicious and successful mode of treating erysipelas. The following was the practice, which he pursued in the Hôtel Dieu.

In the *bilious* erysipelas, whatever degree of heat or fever may exist, he gives, in the first instance, a grain of emetic tartar dissolved in a considerable quantity of fluid; the symptoms generally diminish as soon as the effects of the medicine have ceased. He has seen them entirely subside, although the medicine produced no other sensible alteration, in the animal economy, than an increase in the secretions of the insensible perspiration and urine: sometimes the symptoms resisted these evacuations, and he was obliged to have recourse once or twice, or even more frequently, to the use of the emetic-drink. When the erysipelas is cured, and the bitterness in the mouth and fever have subsided, two or three purges of cassia and manna, with a grain of emetic-tartar, are exhibited: during the process of the cure, the patient is ordered to drink freely of a diluting ptisan, acidulated with oxymel: as soon as the symptoms are mitigated, the diet of the patient is allowed to be made more nourishing and generous; for, when it is too rigidly observed, the bilious erysipelas is apt to be produced, particularly in hospitals, where the air, generally speaking, is unhealthy.

The bilious erysipelas, however considerable its extent, and whatever part it may occupy, yields in a few days, to the plan here laid down; and, in the end, Desault always succeeded in the cure; nor did he recollect an instance of its return. He invariably observed, that the cases of the patients, who had been bled previously to their admission into the hospital, were more serious and obstinate, particularly, when it had been frequently repeated.

The same practice is not applicable to the *phlegmonous* species of erysipelas. In this kind, emetics and other evacuants augment the irritation and tension, already considerable, nor should they be had recourse to till the plethora and irritation of the patient are diminished by one or more bleedings, according to the urgency of the symptoms and the strength of the patient. The bilious erysipelas, which then appears, points out the necessity of evacuations, and the proper time for their exhibition. During the whole treatment, the patient takes nothing but a diluting drink, such as whey, or a simple decoction of dog's tooth with oxymel.

When erysipelas arose from an internal cause, Desault did not employ any topical application whatever, in either species, but left the part, as much as possible, exposed to the air.

But when either bilious or phlegmonous erysipelas is consequent to a contusion, wound, or an ulcer, regimen and internal medicines, according to Desault, are insufficient, unless topical applications are employed to abate the local irritation, and to excite suppuration; with this view, cataplasms have been employed, and their good effects, he says, have been remarked in a great variety of cases: but he deems this caution essential, viz. that the application of the poultice should not extend much below the contused surface, or the edges of the wound. If any application is permitted to lay on the rest of the erysipelatous surface, according to Desault, it should be aqueous and weak, such as the aq. veg. min. in common use, made in the proportion of ʒj. of the extract of Saturn to a pint of water. (See *Desault's Parisian Chirurg. Jour. Vol.*2.)

For my own part, I have always been in the habit of applying Goulard's Lotion to erysipelatous cases arising from wounds, and other kinds of local irritation, and I have had every reason to think such applications as beneficial in these affections as in phlegmon.

Mr. Pearson prefers mild warm cataplasms, composed of the powders of aniseed, fennel, camomile flowers, &c. mixed with a fourth part, or an equal quantity, of bread, and a proper quantity of milk. Linseed powder, he says, may sometimes prove a convenient addition.

Such writers, as have divided erysipelas into the *acute, œdematous*, and *gangrenous*, adopt the following modes of practice.

The first indication in the treatment of the acute erysipelas, is to lessen the inflammation by bleeding, which is to be repeated, more or less, according to symptoms. Such other means are also to be adopted, as tend to diminish the force of the circulation. In short, the antiphlogistic plan, in the full sense of the expression, is proper.

In general, it is unnecessary to repeat bleeding, in any case of erysipelas, so frequently as is done in other inflammatory cases. We ought to be guided, however, in this respect, by the state of the pulse, and other symptoms, never forgetting the patient's age, the degree of strength before the disease, and the situation of the disorder itself. *Cæteris paribus*, the patient will bear bleeding better in the country, and in an open, pure air, than in a large city, and especially in an hospital.

The circulation, in the vessels on the surface of the body, should also be promoted by diluting beverages, proper doses of nitre, the saline mixture, and, above all, by administering small doses of the antimonial powder, or tartar emetic. The belly should be kept open by glysters, and mild laxatives, and, when the patient is very much inconvenienced by the irritation and excessive heat of the part affected, small doses of opium may occasionally be given.

A gentle emetic very often has an exceedingly good effect in calming the fever, and expediting the cure of the erysipelas, especially after bleeding has been practised. But emetics are not to be continued, when they have a purgative effect.

In this complaint, as in every other one, in which the head is affected, the patient should be made to keep his head, as much as possible, in an elevated position.

In the œdematous erysipelas, perhaps, bleeding is never admissible. The loss of even a very small quantity of blood may have the most fatal consequences. One should also be exceedingly sparing of other evacuations. A determination to the skin should in particular be kept up by antimonials, and irritation and pain soothed by administering the *spiritus ætheris vitriolici compositus*, æther, camphor, opium, &c.

When the disorder seems to shift its situation to any internal part, and, particularly, to the brain, blisters should be applied between the shoulders, to the head or legs, without the least delay.

In order to prevent the complaint from terminating in mortification, the patient's strength should be supported by tonic remedies, such as wine and bark.

With regard to the treatment of the gangrenous erysipelas, nothing more need to be said than what is contained in the article on mortification.

Consult *Desault's Parisian Chirurgical Journal, Vol.* 2. *Also Œuvres Chirurgicales de Desault par Bichat, Tom.* 2, *p.* 581, *&c. Encyclopédie Méthodique, Partie Chirurgicale, art. Erysepéle. Cullen's First Lines of the Practice of Physic, Vol.* 1. *Pearson's Principles of Surgery. Some Parts of Hunter's Treatise on the Blood, Inflammation, &c. Richerand's Nosographie Chirurgicale, Tom.* 1, *p.* 118, *&c. edit.* 2. *Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 8, *&c. edit.* 1809.

ERYTHEMA. (from ερυθρος, red.) A redness of any part. For the erythema mercuriale, see *Mercury*.

ESCHAR. (from ισχαρω, to form a scab, or crust.) This term is applied to a dry crust, formed by a portion of the solids deprived of life. When any living part has been burnt by the actual, or potential, cautery, all that has been submitted to the action of this application, loses its sensibility and vital principle, becomes hard, rough on the surface, and of a black, or grey, colour, forming what is properly named an *eschar*. This, in short, is only a slough, produceds by caustics, or actual fire.

ESCHAROTICS. (from ισχαρω, to form a crust over.) Applications, which form an eschar, or deaden the surface on which they are put. By escharotics, however, surgeons commonly understand the milder kind of caustics, such as the *hydrargyrus nitratus ruber, ærugo æris*, &c.

EXÆRESIS. (from ἐξαιρεω, to remove.) One of the divisions of surgery adopted by the old surgeons; the term implies the removal of parts.

EXCISION. (from *excindo*, to cut off.) The cutting off any part.

EXCORIATION. (from *excorio*, to take off the skin.) A separation of the cuticle; a soreness, merely affecting the surface of the skin.

EXCRESCENCE. (from *excresco*, to grow from.) A tumour, growing out of, or from any part, and not included in its substance.

EXFOLIATION. (from *exfolio*, to cast the leaf.) The separation of a dead piece of bone from the living is termed, *exfoliation*.

One part of a bone is never separated from another by the rotting of the dead part, for that which comes away is as sound as it ever was. Exfoliation takes place soonest in bones, which have the fewest cells, and whose texture is the closest. Before any part of a bone can be thrown off, by exfoliation, it must be dead. But, even then, till the process of exfoliation begins, the bone adheres as strongly as ever, and would remain for

years, before it could be separated by putrefaction alone. Bones are composed of two substances, viz. a true animal matter, and an earthy one, which are only intermixed with each other. A dead bone acts on the system, in the same manner, as any other extraneous body. It stimulates the adjacent living parts; in consequence of which, such a process is begun, as must terminate in its being thrown off. The effects of this stimulus are, first, that the living adjacent bone becomes more vascular; a circumstance, which always takes place, when a part has more to do, than is just sufficient for the support of life. Secondly, that the earth of the living part, where it is in contact with the dead bone, is absorbed; hence, the bone becomes softer, and adheres by its animal matter only. Thirdly, that the living animal part is at last absorbed along the surface of contact: this part of the process commences long before the last is finished. Both of them begin, first at the surface, though, in their course, they do not every where take place in an equal degree at the same time. Fourthly, in proportion to the waste, made by the last part of the process, a fungus arises from the living surface, and fills up the intermediate space, so that there is no vacuum. These different stages together constitute ulceration. When any part of a bone is once loose, it will be pushed to the surface in the same manner, as most other inanimate bodies would be, and this stage is partly mechanical, and partly a continuation of ulceration. A proof of the third stage, above-mentioned, may be derived from cases, in which people die, while exfoliation is going on. A small groove, or worm-eaten canal, can then be discovered, which becomes gradually deeper, and follows the irregularities of the living and dead surfaces. After the application of the trepan, a circular piece of bone is frequently thrown off, which is always less than the space from which it came. This, however, would never be the case, were there not a loss of substance. (*John Hunter.*)

It was anciently believed, that whenever a bone was denuded, the exposed surface must necessarily exfoliate, and, this being taken for granted, the old surgeons used to set about bringing on an exfoliation as quickly as possible. For this purpose, the actual cautery was usually applied to the part of the bone, which was uncovered, and, as under such treatment, a portion of the bone was of course killed, and then exfoliated, the prejudiced practitioner believed, that he had only accelerated a process, which must of necessity have followed in a slow and tedious manner.

Mr. Hunter very truly remarks, that neither caustics, nor the actual cautery, hasten exfoliation; they only produce death in a part of the bone, which is the first step towards exfoliation. If caustics ever hasten exfoliation, when the bone is already dead, it must be by producing inflammation in the adjacent living bone this brings about a change in it, and makes it exert a power, which it was incapable of before.

Exfoliation is not a necessary consequence of a bone being laid bare, and deprived of its periosteum. If the bone be in other respects uninjured, healthy, and enjoying a vigorous circulation of blood through its texture, granulations will be generated on the surface of such bone, which will cover and firmly adhere to it, without the smallest exfoliation being thrown off; especially, in young subjects. But, if caustic, stimulating, or drying applications be made use of, the circulation in the surface of the bone will necessarily be disturbed and destroyed, and that part of the surface, through which the circulation ceases to be carried on, will be separated, and cast off, by the process of exfoliation.

If any application to an exfoliating portion of bone be at all efficacious, it must be one, which will stop the mortification in the affected bone, and promote the absorption of those particles of bone, which form the connexion between that which is living and that which is actually dead. And as the bone dies from the same causes, as the soft parts mortify, we should at least follow the same principles in practice, which we do in the latter instance, and, though from the inferior vascularity and vital powers of the bones, we cannot expect surgery to have so much control over their affections, as over those of the soft parts, yet, every good will be obtained, which it is possible to acquire. Attention to such principles will at least teach us to avoid making the death of part of a bone more extensive, than it would be, if the cautery, caustics, and strong astringents, were not employed.

The best mode of attempting to prevent an exfoliation from occurring at all on a bone, that has been exposed by a wound, is, to cover the part again, as soon as possible, with the flesh, which has been detached. This, as we shall notice in the article *Head, Injuries of*, may generally be practised with advantage, when the scalp has been detached from the cranium, provided the flap is still connected with the rest of the integuments.

When the exposed bone cannot be covered, it should be dressed with the mildest and simplest applications, with plain lint, or lint spread with the unguentum spermatis ceti.

The dead pieces of bone, when very tedious in exfoliating, when wedged in the substance of the surrounding living bone, and when so situated as to admit of being safely sawn, or cut away, may be removed in this manner, as is described in the articles *Caries* and *Necrosis*. In such operations, Mr. Hey's saws are eminently advantageous.

In speaking of necrosis, we shall have occasion to notice the efficacy, which Mr. Crowther has found blisters possess in quickening the cure of necrosis, when kept open by the savin cerate, as recommended in his work on the white swelling.

EXFOLIATIVUM. (from *exfolio*, to shed the leaf.) A raspatory, or instrument for scraping exfoliating portions of bone.

EXOMPHALOS. (from ἐξ, out of, and ομφαλος, the navel.) A hernia, protruding at the navel.

EXOPHTHALMIA. (from ἐξ, out, and οφθαλμος, the eye.)

In the case, to which the most judicious surgical writers apply the terms, *exophthalmia, ophthalmoptosis, ptosis bulbi oculi*, the eyeball is of its natural size, and free from disease; it merely changes its situation, and partly or completely protrudes from the orbit. It is only confusing the subject to consider, as specimens of this disease, the cases, in which the globe of the eye is affected with enlargement, and on that account projects from the orbit in a preternatural degree, as happens in hydrophthalmia, staphyloma, and cancerous diseases of the eye. When the globe of the eye is pushed entirely out of the orbit, it generally lies upon the temple, or cheek, and vision is totally destroyed. There are instances, however, in which a considerable degree of sight has been recovered, notwithstanding the exophthalmia was most complete, and had lasted several years. (*Hope in Philosophical Transactions for* 1744, *Richter's Bibl.* 4 *Band*, *p.* 343.)

There are three descriptions of causes, which may occasion exophthalmia.

1. The first and least common is a violent concussion of the head. A man fell from a height of about fifteen or sixteen feet, and pitched upon his head. The right eye was forced out of its socket, and hung over the cheek. The patient was deprived of his senses immediately after the accident, and became affected with coma. There was a contusion over the right parietal bone; but, no fracture. The eye spontaneously resumed its natural position, a short time after the accident, and, in the course of a month, with the assistance of low diet, and repeated bleeding, the cure was completed. (*Mém. de l'Acad. de Chirurgie, Tom.* 1, *p.* 198, 4*to.*) It has been alleged, that the eye has been forced out of the orbit in a violent fit of sneezing. But, such cases, says Richter, are very uncommon, and always imply a considerable relaxation of those parts, which serve to retain the eye in its socket, or some other predisposing causes, to which attention should be paid in the treatment. (*Richter's Anfangsgrunde der Wundarz. Band* 3, *p.* 407, *edit.* 1795.)

2. A far more frequent cause of exophthalmia is a thrust in the eye with an instrument, which is narrow enough to pass between the orbit and the eyeball, so as to push the latter out of its place.

A stick, a tobacco pipe, (*White's Cases in Surgery, p.* 131.) a foil, &c. may cause the accident. Repeated experience proves, says Richter, that in such cases, however forcibly the optic nerve and muscles of the eye may be stretched; however much the interior parts of the organ may be injured on the occasion; and, though the dislocated eye be generally deprived of the faculty of seeing, yet, when the organ is replaced as speedily as possible, it not only recovers its natural motion, but also its original power of vision. (See *Scultet. Appendix, Obs.* 9. *Covillard, Obs.* 27. *Borel, Centur.* 3, *Obs.* 64. *Rhodius, Centur.* 1, *Obs.* 84, *White's Cases, p.* 131.) But, before we reduce the eye, Richter advises us always to examine the instrument, which was pushed into the orbit; as, when it is brittle, a fragment of it is exceedingly apt to remain behind in the socket, and will require to be extracted by means of the finger, or a probe. When the weapon is pointed and hard, it sometimes pierces the bones of the orbit, and enters the brain, nose, or antrum. In the first case, which is often difficult to ascertain immediately, though after a time it is generally rendered plain enough by the symptoms induced, the consequences are mostly fatal. In the two other cases, although the danger is not pressing, yet the surgeon should be very attentive, in the event of suppuration, to procure and maintain a ready outlet for the matter.

There is generally little difficulty in replacing the eye. Frequently it returns of itself into its natural situation again, as soon as any trivial obstacles to its reduction are removed; and, in other instances, it easily admits of being put into proper place with the hand. The indication, says Richter, is always accomplished with more facility, the sooner it is attempted. When the protrusion has existed several days, and the eye and other parts in the orbit are already inflamed, Richter recommends us to endeavour to diminish the inflammation by general antiphlogistic means, and external emollient applications, before we try to replace the eye, and afterwards attempt to effect the reduction of this organ

in a gradual manner. When the optic nerve, and one or more of the muscles of the eye, are torn, no hope can be entertained, that the eyesight and motion of the organ will ever be regained. But, this degree of injury, as Richter observes, cannot always be immediately detected, because the optic nerve and muscles are concealed by the conjunctiva; and, if the nature of the case were known, still it would be advisable to replace the eyeball, and endeavour to prevent the disfigurement, which its loss would unavoidably produce. But, says Richter, it is necessary, especially if the parts behind the eyeball have suffered severely, to use such means, as will ensure a ready escape for the matter, which may possibly form. The injury of the conjunctiva, muscles, and nerve, may be so violent, adds this experienced writer, that the practitioner may find it most prudent not to reduce the part, until after suppuration has taken place. Richter thinks, that a surgeon may the more readily make up his mind to this conduct, as many cases have proved, that the eyeball, even after being dislocated from the orbit a long while, has been easily replaced. The parts, which connect the eye with the orbit, may in other cases be so torn and injured, that it may be most advisable to extirpate the organ. Richter maintains, however, that this should never be done, when there is the least chance of saving the eye. If the bones in the orbit should be fractured, the reduction must not be made until the indications, which this complication presents, have been fulfilled.

When, says Richter, the instrument, with which the eye has been pushed out of its socket, is blunt and thick, like a finger, a stick, a foil, &c. the eyeball itself always sustains a violent contusion, which brings on vehement inflammation, and lessens or destroys all hope, that, after the reduction, the eyesight will be restored. Sometimes, in these cases, an extravasation of blood in the orbit occurs, the iris is lacerated, the cornea burst, and a part of the humours of the eye discharged. Although, under such circumstances, it is scarcely to be expected, that the eye-sight can be recovered, yet, it is proper to reduce the eye, because should the organ be destroyed by suppuration, or the loss of its humours, the deformity may be obviated by an artificial eye, which is not the case, when the eye has been cut away. It is also to be considered, that the mischief often seems to be worse, than it really is, and the eyesight is sometimes regained contrarily to all expectation.

After the reduction of the eye, the first care of the surgeon should be to prevent and diminish inflammation. In some cases, the inflammation is slight; while, in others, especially, when the eyeball has been severely struck, it is extremely violent. All the usual antiphlogistic means, both general and topical, are to be employed, and, of the latter, Richter says, astringents are the best, as the inflammation arises from the contusion and stretching, which the parts have suffered. The possible consequences of the inflammation, such as suppuration, opacity of the cornea, &c. are to be treated according to the rules laid down in other parts of this dictionary. (See particularly *Cornea, Opacity of; Hypopium; Ophthalmy.*) In general, the sight is restored in proportion as the inflammation is diminished. Should this not happen, after the ophthalmy has been entirely removed, the surgeon must try what effect such remedies, as stimulate the nerves, will have upon the optic nerve. An account of the most eligible medicines, for this purpose, will be found in the article *Amaurosis.*

3. The third cause of exophthalmia is a preternatural tumor in the orbit. The swelling, as it enlarges, gradually pushes the eyeball out of its socket. The tumors, which may be formed in the orbit, are of several kinds. The principal, however, are encysted swellings, which may contain either an aqueous fluid, a pappy substance, or a thick matter. Sometimes, the cellular substance in the orbit is affected with induration and swelling, so as to force the eye partly or completely out of this cavity. An abscess in the orbit has also been known to make the eyeball protrude. (*Pellier.*) Exostoses in the orbit have had the same effect. In some cases, in consequence of suppuration in the antrum, the lower part of the orbit has been raised, and the eye forced out of its place. Fungous diseases of the antrum are very liable to occasion such mischief. (See *Parisian Chirurgical Journal, Vol.* 1, *p.* 104, *&c.*) In all these examples, the eyeball is displaced from the orbit gradually, and vision is at length impeded. Instances, however, are on record, where the sight was never lost, though the eye was protruded for years. (See *Richter's Chirurg. Bibliothek.* 4 *Band,* 2, *Stuck, p.* 243. *White's Cases in Surgery, p.* 135.)

Experience proves, also, that after the reduction, the motion of the eye, and power of seeing have been regained, in cases, where the eye has been gradually pushed out of the orbit, and been displaced a considerable time, even as long as several years, during all which period vision was lost. (*Acrell; Brocklesby in Med. Obs. and Enquiries, Vol.* 4.) In order to reduce the eye into its natural position, it is necessary to remove the cause, by which its protrusion is occasioned. Sup-

puration and fungous tumours in the antrum must be treated according to directions laid down in the article *Antrum*. After the cure of such diseases, the antrum is often reduced to its natural dimensions, and, in this circumstance, the orbit may become so wide, that the eyeball will return into it again. Should this not happen, the extirpation of the organ will be proper. The induration and swelling of the cellular substance in the orbit may be sometimes dispersed by means of mercury. (See *Louis, sur Plusieurs Maladies du Globe de l'Œil, in Mém. de l'Acad. Royale de Chirurgie, Tom.* 13. *Edit.* 12*mo.*) When such treatment fails, we are recommended to extirpate the eye. (*Richter's Anfangsgr. der Wundarzneykunst, Band* 3, *p.* 413.) Exostoses, which are situated in the anterior part of the orbit may sometimes be removed. The continental surgeons generally advise us to expose the tumor by an incision, and to apply caustic, or the actual cautery to it, in order to kill the protuberant part of the bone, and make it exfoliate. In this country, most practitioners would prefer the employment of cutting instruments for removing such exostoses. When, however, the tumour lies deeply in the orbit, it cannot be got at, and, if it should resist the effect of mercurial medicines and mezereon, we are directed to extirpate the eye. (*Richter, op. et loco cit.*) Abscesses in the orbit ought to be opened, and, after this has been done, the eye generally returns into its proper position. (*Pellier.*) Encysted tumours in the orbit seldom admit of being extirpated in the customary manner. Richter says, it is best to open them, press the contained matter out, and extract the cyst either immediately, or after a few days.

In a late publication, a memorable case of exophthalmia is related by Mr. Travers: the globe of the eye appears to have been gradually forced upwards and outwards, and to have had its motions considerably impeded, in consequence of the orbit being partly occupied by two swellings, which were of the nature of the aneurism by anastomosis.—(See *Aneurism.*) The swellings could not have been removed, without at the same time extirpating the eye. Mr. Travers was therefore induced to try, whether applying a ligature to the carotid artery would have the effect of checking and curing the disease; an expectation, which was warranted by analogous instances, in which the growth of swellings, and their dispersion, are brought about by lessening the quantity of blood determined to them. The experiment completely succeeded; the swellings in the vicinity of the eye subsided; the patient was freed from several grievous complaints, to which she had been previously subject; and, amongst other benefits, a cure of the exophthalmia was one result, which most interests us in the present place. The case is also highly important on other accounts, and, more particularly, as confirming the fact, that the carotid artery may be tied, without any dangerous effects on the brain, and, as proving, that, in cases of aneurism, the surgeon should not be afraid of proceeding to such an operation. (See *Medico-Chirurgical Transactions, Vol.* 2, *Art.* 1.) As I have had occasion to disagree with Mr. Travers upon one or two points in other parts of this dictionary, I feel infinite pleasure in taking this opportunity of applauding the judgment and decision, with which he acted in the case, that we have cited.

When the causes of exophthalmia have been removed, the eye must be put into its natural situation. If the organ has been long displaced, the surgeon often finds the fulfilment of this indication attended with difficulty. Indeed, he is frequently obliged to employ methodical bandages for the purpose of promoting the gradual return of the eye into the orbit. Yet, even in such cases, the eyesight, is often regained; but, if this should not happen spontaneously, stimulants and tonics ought to be tried. (See *Amaurosis.*)

I shall conclude this article with referring to such authors, as present us with the most interesting cases and information on the preceding subject.

Fab. Hildan. centur. 6, *obs.* 1. *Vander Wiel, centur.* 2, *obs.* 9. *Paw, obs. anat.* 23. *Tulpius, lib.* 1, *cap.* 28. *Hope, in Philosophical Trans. for* 1744. *M. Louis sur plusieurs malaflies du Globe de l'Œil, &c. in Mém. de l'Acad. de Chirurgie, Tom.* 13, *in* 12*mo. Brocklesby, in Medical Obs. and Enquiries, Vol.* 4, *p.* 371. *White's Cases in Surgery, p.* 131—135, *&c. Warner's Cases in Surgery, p.* 108. *Edit.* 4. *Lassus, Pathologie Chirurgicale, Tom.* 2, *p.* 144. *Edit.* 2. *Richerand's Nosographie Chirurgicale, Tom.* 2, *p.* 117. *Edit.* 2. *Medico-Chirurgical Transactions, Vol.* 2. *art.* 1. *Richter's Anfangsgründe der Wundarzneykunst, Band* 3, *p.* 406, *&c. Gottingen* 1795. *The matter in this last work forms the basis of the foregoing observations.*

EXOSTOSIS. (from ἐξ, out, and ὀστέον, a bone.) A bony excrescence, or tumour, growing out of some part of a bone.

If bones resemble the soft parts of the body in their structure, they must resemble them in their diseases, and a swelling may take place in bones, as well as other parts; but, there is a particular kind of tumour, which forms on their surface, and which is denominated an *exostosis.*

The generality of writers, even the most modern, have admitted many diseases among exostoses, which ought to be considered in a very distinct light; I need only instance the spina ventosa.

There seem to me to be only three species of exostosis, exclusively of venereal nodes. The first is the true exostosis, or osseous tumour growing from the very substance of a bone. The second consists chiefly in a thickening, and induration of the periosteum. And the third kind of exostosis might be termed *fungous*. An instance of such a disease growing from the cavity of the antrum, is related by Mr. Abernethy, in the Medical and Chirurgical Transactions, and quoted in another part of the present Dictionary. (See *Antrum*.)

The bony swelling, in some cases, acquires such a hardness, that no remains of a fibrous structure can be distinguished, and it absolutely resembles ivory; in other cases, it is spongy; and, lastly, it may be composed of osseous and fleshy parts together.

The bones, most frequently affected with exostosis, are those of the cranium, the lower jaw, sternum, humerus, radius, ulna, bones of the carpus, the femur, and tibia. There is, however, no bone of the body, which may not become the seat of this disease. It is not uncommon to find the bones of the cranium affected with exostosis in their whole extent. The ossa parietalia sometimes become an inch thick. (*Boyer*.)

The exostosis, however, mostly rises from the surface of the bone, in the form of a hard round tumour, and venereal exostoses, or nodes, are observed to arise chiefly on compact bones, and such of these, as are only superficially covered with soft parts, as for instance, the bones of the cranium, and the front surface of the tibia.

The causes of exostoses do not seem to be at all understood. Most writers impute the disease to internal causes, such as scrofula and lues venerea. That the latter affection is the cause of nodes, which are certainly a species of exostosis, no one will deny; but, that scrofula is ever concerned in producing any of the other kinds of exostosis must not be admitted, at least, before some evidence is adduced in support of the doctrine.

The ease, with which bony tumours form in some persons, is certainly a very remarkable fact, and tends to render it probable, that constitutional causes have considerable influence. I remember, that Mr. Abernethy mentions, in his lectures, his having seen a boy, who came out of Cornwall, who was so excessively afflicted with an apparent predisposition to exostoses, or an exuberant deposition of bony matter, that a very trifling blow would occasion a bony swelling on any bone of his body. His ligamentum nuchæ was ossified, and prevented the motion of his neck; the margins of his axillæ were also ossified, so that he was, as it were, completely pinioned. Besides all this, the subject in question, had numerous other exostoses on various parts of his body. Mr. Abernethy gave, in this case, the muriatic and acetic acids, with a view of dissolving the lime in the lad's system, which this gentleman thought might be too abundant, and not duly carried off in proportion to its secretion. The boy was also forbidden to eat food, containing any kind of lime.

An exostosis is always hard, but its size is various, and it may be indolent, or painful. By these signs, and its firm adhesion to the bone, it may be always distinguished from other tumours. Some exostoses cannot be ascertained before death. Such was the case in which the parietal bone was found, after death, to be three times thicker, than natural. Such also was the example, related in the memoirs of the Academy at Dijon, in which a person died from an exostosis on the internal side of the os pubis, which tumour prevented the discharge of the urine, or the introduction of a catheter, by its pressure on the neck of the bladder. (*Boyer*.)

Should an exostosis take place in the orbit, the eye would of course protrude preternaturally from this cavity, constituting a case of exophthalmy. Facts of this kind are to be met with on record.

Our ignorance of the pathology of exostoses, particularly their causes, accounts for the imperfection of our treatment of them. With the exception of the venereal exostosis, or node, there is no species of this affection, for which, it can be said, that we have any one medicine of the least efficacy.

Boyer, and other writers on the diseases of the bones, seem to regard some exostoses, as a perfectly inorganic mass of lime, and, consequently, they entertain no idea, that the absorbent vessels can possibly take away the particles of the tumour, just as the secerning arteries have laid them down. Such writers, however, were well aware, that nodes were capable of being diminished, and this could only be effected by the action of the absorbent system.

Whether any exostoses might be lessened by keeping open a blister, over such tumours, for a considerable time, is a point, perhaps, worthy of further investigation. It is certain, that such applications tend to diminish venereal nodes, after they have been lessened as much as they can be by mercury; and we also

know, that blisters, kept open, promote the absorption of the dead bone in cases of necrosis.

When exostoses merely occasion a deformity, and no pain, nor inconvenience, from the pressure, which they produce on the neighbouring parts, it is certainly most advisable not to undertake any operation for their removal; for, as Boyer has truly observed, in by far the greater number of instances, the local affection is much less to be dreaded, than the means used for removing it.

Caustics and the cautery have occasionally been applied to exostoses; but, they always do mischief. Boyer mentions an unfortunate woman, who had a caustic applied to an exostosis of the inside of the tibia; but which, instead of removing the tumour, caused a necrosis, of which she was not well two years afterwards.

When exostoses are productive of much pain and injure the health, and their situation admits of their being safely removed, with the aid of suitable saws, or even with that of a gouge and mallet; the operation may be undertaken. Many tumours of this kind, however, have bases so very extensive, and deep, that, when situated on the limbs, amputation becomes preferable to any attempt made to saw or cut away the exostoses, so as to preserve the members, on which they are situated.

In removing an exostosis, its base must be as freely exposed by the knife, as circumstances will allow, and to this part a small fine saw may be applied. It appears to me that in cutting away some exostoses, the flexible saw, described by Dr. Jeffray, of Glasgow, (see *Amputation*,) might be found useful. Mr. Hey's saws are now so well known to the profession, that I scarcely need recommend them to be remembered in the present cases.

EXTIRPATION. (from *extirpo*, to eradicate.) The complete removal, or destruction of any part, either by cutting-instruments, the action of caustics, or the application of a ligature.

EXTRACTION. (from *extraho*, to draw out.) The taking extraneous substances out of the body. Thus bullets and splinters are said to be *extracted* from wounds; stones from the urethra, or bladder.

Surgeons also sometimes apply the term, *extraction*, to the removal of tumours out of cavities, as for instance, to the taking of cartilaginous tumours out of the joints; they seldom speak of extracting any diseased original part of the body; though, they do so in one example, viz. the cataract.

EXTRACTION OF THE CATARACT. See *Cataract*.

EXTRAVASATION. (from *extra*, out of, and *vas*, a vessel.) A term, applied by surgeons to fluids, which are out of their proper vessels, or receptacles. Thus, when blood is effused on the surface, or in the ventricles of the brain, it is said, that there is an *extravasation*. See *Head, Injuries of*. When blood is poured from the vessels into the cavity of the peritoneum, in wounds of the abdomen, surgeons call this accident an *extravasation*, or when the contents of any of the intestines are effused in the same way. The urine is also said to be *extravasated*, when, in consequence of a wound, or of sloughing, or ulceration, it makes its way into the cellular substance, or among the abdominal viscera. When the bile spreads among the convolutions of the bowels, in wounds of the gall-bladder, this is a species of extravasation.

In wounds of the thorax, an extravasation of blood also frequently happens in the cavity of the pleura. Large quantities of blood are often extravasated in consequence of the vessels being ruptured by violent blows: in the scrotum, on the shoulder, and under the scalp, this effect is observed with particular frequency.

In the articles, *Head, Injuries of*, and *Thorax, Wounds of:* enough is said of extravasations of blood in the cranium, and in the cavity of the chest. Under the term *Abdomen*, much has likewise been explained relative to extravasations in that part of the body. I mentioned, however, my intention of giving in the present place a more detailed account of the valuable observations of M. Petit on this subject, and I now proceed to fulfil my promise.

Various kinds of fluids may be extravasated in the abdomen in cases of wounds, sloughing of the intestines, &c. Bile, chyle, urine, blood, feces, &c. may all possibly be effused under particular circumstances,—circumstances already pointed out in the article, *Abdomen*. Surgeons used formerly to suppose, that, whenever any fluid escaped from a vessel, or bowel, into the general cavity of the peritoneum, it always became extensively diffused amongst the convolutions of the intestines. This erroneous supposition seemed to be confirmed by facts, the most open to observation, and completely exempt from the possibility of mistake. Practitioners saw, that the water of dropsies, the pus of abscesses, which had burst into the abdomen, as well as the chyle and feces, which had escaped through a wound, or other sort of breach of an intestine, were invariably and universally

diffused amongst the folds of the mesentery and bowels after death.

M. Petit (the son) first questioned the accuracy of the foregoing opinion, in relation to living subjects. He suggested, that, as in the living body, the intestines were distended with feces, alimentary matter, and air, while they were also mutually acting against each other, and in a continual state of compression from the alternate contraction of the diaphragm and abdominal muscles, there might be a superior resistance made to the weight of the extravasated fluid, which weight has a tendency to produce a separation of the viscera from each other. Is it not possible, says M. Petit, that, as soon as the patient is dead, and as soon as the above kind of resistance is destroyed, the extravasated fluid may spread without difficulty. M. Petit contends, that the truth of the preceding suggestion cannot be doubted, when we consider, that certain cases of hernia get well, notwithstanding the bursting of the gangrenous part of the intestine, after its reduction into the abdomen. In such instances, indeed, the contents of the bowel appear to escape externally through the wound entirely in consequence of the resistance made to their diffusion amongst the convolutions of the intestines. It might be objected, however, that, in cases of hernia, since the bowel is almost always adherent to the edge of the abdominal ring, the issue of the intestinal matter through the wound is rather to be ascribed to the ease, with which this event may happen, than to any resistance made internally by the surrounding viscera. But, M. Petit cites several cases, which leave no doubt, that there is a vast resistance made to the passage of extravasated fluids amongst the convolutions of the bowels, and folds of the mesentery.

After death, any fluid, extravasated in the abdomen, *may, by its mere gravity*, become dispersed among the viscera, because the parts being without action, make no opposition. But, in the living state, all the abdominal viscera reciprocally act, upon each other, and forming in consequence of this mutual support, as it were, only one body, the resistance, which is made to any extravasated matter will always keep it from becoming so widely diffused as many have imagined.

As Mr. Travers seems not to have comprehended the true sense of this part of M. Petit's essay, and has published some criticisms, which cannot be fairly applied to this valuable writer, I shall take the present opportunity of doing justice to a much respected surgeon, who cannot now stand up for himself. M. Petit writes: "Après la mort, un fluide *épanché dans le ventre, peut par son seul poids* s'insinuer à son gre et se disperser entre les différentes parties, parce qu' étant sans action, elles n' opposent aucune résistance; mais pendant la vie tous les visceres du bas-ventre agissant mutuellement les uns contre les autres, et ne faisant pour ainsi dire qu'un même corps au moyen de cette action mutuelle, la résistance qu'ils opposent au fluide épanché, ne lui permettra jamais de se disperser de la maniére dont on se l'est figuré." (*Mém. de l'Acad. de Chirurgie, Tom.* 13, *p.* 169, 170.) We see, that M. Petit is here speaking of the way, in which matter, *already extravasated*, is kept from being extensively diffused in the living subject, and is endeavouring to explain, how when the compression, which all the abdominal viscera sustain during life, from the action of the muscles and other causes, is put at an end to by death, *the mere gravity of the fluid, already extravasated*, may cause it to spread, and, on opening the body, the appearances may induce an erroneous idea, that the fluid was thus widely diffused, before the patient's decease.

Petit's own words, with the short comment, which I have taken the liberty to annex, will clearly shew, first, that this writer has by no means involved himself in the *glaring absurdities*, imputed to him by Mr. Travers; and, secondly, that the following remarks of this last gentleman are totally inapplicable to M. Petit.—"Granting the assumption of effusion after death, I would enquire," says Mr. Travers, "what is the nature of the *action* exerted by a dead intestine, and from what cause, or, in what degree, its *proper action* is superior to that of the surrounding parts? But, how stands the fact? *I assert, that effusion from a wounded bowel meets with the same impediment in the dead as in the living body, the resistance being purely passive.* If, therefore, effusion depends, as I am quite willing to admit, upon the action of the wounded vessel overcoming the opposed resistance, it follows, that it can never happen after death, because action has ceased, whilst resistance remains the same." (*Travers on Injuries of the Intestines, &c. p.* 15, 16.)

If Petit had alleged, that extravasation took place after death, from the action of a vessel, bowel, &c. his assertion would have been a fair mark for criticism; but, he neither says, nor means any thing of the kind: he simply explains, that matter, already extravasated before death, afterwards becomes more diffused by its own gravity, and the cessation of all active resistance to this occurrence in the dead body.

With respect to Mr. Travers's assertion, "*that effusion from a wounded bowel meets with the same impediment in the dead, as in the living body, the resistance being purely passive*," I am sorry I cannot find reason to coincide with this unqualified declaration. By what perversion of language and common sense, can the resistance, made by the action of the diaphragm and abdominal muscles upon the viscera in a living body, be called *passive?* And would the cessation of this action, and the consequent removal of the pressure from the viscera in the living subject, were such things possible, make no difference, in regard to the facility, with which the contents of the bowels might be effused. If Mr. Travers means to ascribe the whole of the resistance to effusion to the pressure of the external air, a cause which other writers have not overlooked, (see *Abdomen*) he may be more correct in the use of the term *passive*; but, his notions of the real state of things will be far too circumscribed.

I shall next follow M. Petit in the inferences, which he has drawn from the reciprocal pressure or action of the abdominal viscera upon each other.

The first consequence is, that an extravasated fluid can only spread in the cavity of the abdomen, in the same way, that a fluid becomes effused in an external part; that is to say, the extravasation can only spread gradually and successively into such places as offer the least resistance. Blood, when it insinuates itself into the interstices of the muscles can only get from one membranous cell into another, by the first one being so distended, that the fluid can more readily get into a second cell, and, from this into a third, than increase the distended state of its first situation. Just so, in the abdomen, the blood, which escapes from a wounded vessel, is first effused into a situation near the opening in the vessel, either between the peritoneum and surface of the intestines, or, more deeply, amongst the convolutions of the bowels, or some of the folds of the mesentery. In proportion as the bleeding continues, the blood forces its original boundary, and dilates the place, which it occupied, in every direction, until it meets with less resistance in making its way, either upward, or downward, or to the right or left. The extravasation continues to dilate the new space, which it fills in the same way, until either the first limits are forced, or the effused fluid spreads in another direction. In this manner, the extravasation will spread, till the resistance, made by the viscera, becomes equal to the impetus, with which the blood issues from the vessel. M. Petit was of opinion, that it was this kind of resistance, which put a stop to the hemorrhage, even before any coagulum had been formed in the opening of the vessel. That the blood, while flowing from the vessel and in a fluid state, should only make one mass, and be contained in one cavity, till coagulation takes place, is a circumstance, which cannot rationally be imputed to any thing else, but the resistance depending upon the mutual action of the viscera in the living state. It is also equally certain, that, it is in consequence of the sudden cessation of such resistance, that extravasated blood, which is fluid after death, becomes diffused among the different convolutions of the bowels, and forms numerous scattered collections.

The second inference, which M. Petit mentions, as deducible from the resistance arising from the reciprocal pressure of the abdominal viscera, is, that an extravasation in the cavity of the abdomen cannot so easily happen, as many have fancied. It was once not an uncommon idea, that a breach in a very moderate vessel would occasion a considerable extravasation, because the orifice could not be compressed, like that of a vessel in a more external situation. It is indeed true, that no compression can be directly applied to the opening of an internal vessel; but, the resistance, which the surrounding viscera make to the extravasation, operates as a substitute. M. Petit even thought, that, when blood was effused in the abdomen, it had a greater resistance to overcome, than when extravasated in an external part. According to this author, the resistance of the cellular membrane, the common bond of connexion between the muscles, is undoubtedly less, than that, which depends upon the reciprocal action of the intestines, and rest of the viscera. The incessant alternate motion of the abdomen and thorax, is in favour of the preceding opinion. The facility, also, with which, abscesses, situated in the abdomen, are discharged, through a small, and, very frequently, not a depending opening, is an additional fact, proving, that the abdominal viscera, by the manner, in which they mutually press upon each other, make a greater resistance to an extravasation, than can be made by the cellular substance in other parts of the body.

Swords have often been thrust completely through the body, without giving rise to any very dangerous symptoms, or only to such, as frequently attend wounds, which do not reach into the cavity of the belly. We cannot imagine, contrary to all probability, that, in this case, the weapon has slipped over the viscera, through their interstices, and, by good luck, has wounded none of the blood vessels. We must rather conclude, that an

extravasation does not always ensue from a wound of the bowels, or blood vessels, or, at least, that the extravasation is not invariably attended with such consequences as former practitioners used to suppose.

For the purpose of rendering the foregoing remarks more intelligible, let us follow M. Petit in his observations, and take notice of the principle, which he has laid down in his excellent memoir; viz. that, without a particular action in the muscular fibres of the intestine, or artery, no extravasation would occur in the abdomen, even were there a breach in such bowel, or vessel. Supposing the blood vessels destitute of action, and the place of the opening pressed upon by a force equal to that, which operates upon the rest of their extent, the fluid, which they contain, would never be effused in the abdomen, so as to form an extravasation. Besides the obvious nature of this fact, M. Petit mentions his having actually seen it exemplified in the body of a man, who died of gangrene in the abdomen, in consequence of a hernia, which had been, for upwards of a fortnight, attended with the most violent symptoms of strangulation. Nearly the whole of the intestinal canal was equally affected with gangrenous mischief, so that it was scarcely possible to handle any of the bowels, without producing a breach in them. However, although the intestines were filled with very fluid excrement, none of it was extravasated in the abdomen. In several places, indeed, Petit found numerous little breaches of continuity, which had allowed a small portion of the excrement to escape; but only just enough to tinge the adjacent parts. Petit acknowledges, at the same time, that, round where these holes were situated, some slight adhesions had taken place between the bowels, and these and other parts; but he contends, that these were so weak, and easily broken, that they must have been incapable of hindering an extravasation. Petit concludes, that, in this instance, no extravasation happened, because the intestinal canal was everywhere affected with gangrene in nearly the same degree, and the disease had destroyed the tone and action of the muscular fibres of the intestines.

It is contended by Petit, that the foregoing case affords sufficient proof, that, without a contractile power in the blood-vessels and intestines, no extravasation of their contents could be produced in the abdomen, and that such an event would be opposed by the action of the abdominal muscles and diaphragm, which make uniform and equal pressure upon all the viscera. If this statement be correct, it is obvious, first, that the greater the action of the wounded vessels is, in relation to the quantity of fluid, which they have to propel, the greater will be an extravasation from them. Secondly; that no extravasation can arise, unless the action of the vessels themselves be capable of overcoming the resistance depending upon the mutual action of the parts. Hence, only wounds of vessels above a certain size can give rise to extravasations, at least, to any of importance. The veins cannot occasion so much extravasation as the arteries: nor are wounds of the intestines so liable to be followed by an effusion of the chyle and feces, as similar injuries of the blood-vessels are apt to be attended with an extravasation of blood. Petit was also of opinion, that wounds of the stomach were not, so often as those of the bowels, the cause of this kind of accident.

The feces cannot be so easily extravasated as blood, not only because the action of the intestines, particularly that of the small ones, upon their contents is weaker, than that of the arteries upon the blood, but, principally, because, when there is a breach in one of the bowels, the contents will continue their course through the intestinal canal, without any need of there being any considerable obstacle to the occurrence of an effusion. Petit admonishes us, however, not to conclude from what has been said, that the chyle and feces can never be extravasated in the abdomen. There is no doubt whatever, he observes, that an *extravasation may take place, when the wound in the bowel is of ample size, the gut filled with chyle, or excrement, and care is not taken to empty the large intestines very often by means of clysters. The event may also happen, when pain and irritation render the muscular action of the intestines violent, and when unequal pressure is made upon the abdomen.* Under such circumstances, s ays M. Petit, the resistance, made to an extravasation, by the reciprocal action of the viscera, is overcome, and the contents of the bowels will continue to be effused, until the impulse arising from the contraction of these organs returns to a state of equilibrium, with the resistance depending upon the mutual action of all the viscera.

The extravasation of chyle and feces, does not take place differently from that of blood; but, in wounds of the bowels, there is this advantage, that the same opening, which has given passage to the extravasated fluid, may also allow it to return and pass off. According to Petit, we need no further proof of this, than the great evacuations of blood, which some wounded persons have had with their stools, without being afflicted with any of the symptoms of an extravasation. It is highly

improbable, that such bleeding could depend upon the injury of any of the vessels ramifying upon the intestinal canal, since their size is too inconsiderable. In these cases, Petit was inclined to believe, that some vessels, either of the mesentery, or another part, were wounded together with the intestine, andthat the blood insinuated itself into, and took its course, through the bowels, in consequence of the resistance made to its extravasation amongst the viscera.

The foregoing observations tend to prove, not only that an extravasation of intestinal matter cannot so easily happen in the abdomen as has been imagined; but, also, that it is less dangerous, than an effusion of blood usually is, and that it is accompanied with less violent symptoms. When the contents of the bowels are extravasated, adhesions are likewise observed to be more readily formed, and to limit the effused matter sooner than when the extravasation consists of blood. After such adhesions have once been formed, Petit conceived it to be probable, that the extravasation may be dispersed in the same favourable manner, as certain abscesses, which have discharged themselves into the intestinal canal. Blood, however, can never return into the vessel, from which it has escaped, since a clot shuts up the opening. But, a wound of an intestine remains continually open, till it is closed by the adhesions, which the bowel contracts to the adjacent parts: adhesion, indeed, is the only means, by which a wound of this description can be healed.

Amongst the numerous facts, says M. Petit, which might be adduced in proof of the difficulty which a wound of the stomach permits the aliment to be extravasated, the operation of an emetic, in such a case, is a striking one. Petit expresses his belief, that vomiting does not depend upon the action of the muscular fibres of the stomach; but, entirely upon the sudden and violent contraction of the abdominal muscles. This author conceives, that if the particular action of the stomach itself had much concern in the production of vomiting, an extravasation of the alimentary matter would necessarily happen in the abdomen, when that viscus was wounded. However, in the instances, referred to by Petit, the occurrence did not take place, because, notwithstanding the violence, with which the abdominal muscles and diaphragm contracted, they made equal and uniform pressure upon all sides of the stomach. The danger of an extravasation is also less, inasmuch as a wound of the stomach is always much smaller, in relation to its cavity, than that of a bowel, in regard to the capacity of the intestinal canal.

Circumstances are very different in respect to wounds of the gall and urinary bladders, especially, when these receptacles are full. An extravasation is then an inevitable consequence, both on account of the great fluidity of the bile, and urine, and the contractile power, with which the parts are endued, and, against which, the action of the abdominal muscles makes no sort of resistance. An extravasation of these fluids is highly dangerous, by reason of their irritating quality with respect to the viscera. The colics and irregular contractions, which these stimulating fluids excite, also tend to make the extravasation become more widely diffused. The ease likewise, with which the bile and urine mix with the serum, that naturally moistens the surfaces of all the viscera, leads us to suspect, that, whenever such fluids are extravasated, they very soon become universally dispersed amongst all the convolutions of the intestines.

Against these latter extravasations, says Petit, little can be done, and, unless they are in small quantity, and their increase can be prevented, the patient's life hardly admits of being saved. Leaving a catheter in the bladder, indeed, is a sure means of hindering the extravasation of urine from increasing; but, not much confidence can be placed in the kind of outlet afforded by the duct of the gall-bladder. In the article *Gunshot-Wounds*, I shall have occasion to notice the proper treatment of wounds of the bladder, as well as the success, with which such injuries were treated by that eminent military surgeon M. Larrey.

When the extravasated matter is completely encysted and circumscribed, it happens, that, as such matter had to overcome the resistance of the parts, before it could be effused, no sooner is a passage afforded for its escape, than the reaction of the separated parts necessarily forces out whatever fluid lies between them. This is a third consequence, which is pointed out by Petit, as resulting from the resistance, made by the reciprocal action of the abdominal viscera to extravasations.

The foregoing remarks tend to prove, that an extravasation in the abdomen, and, especially one of blood, may be as completely discharged, as a collection of fluid in the thorax. The evacuation, at least, may always be easily effected, when the extravasation is bounded on any side by the parietes of the abdomen: a circumstance, which must invariably occur, whenever the extravasation is considerable. Indeed, Petit adds, that it was always the case, as far as his experience went, even when the effusion was not very copious. It is not enough

to make surgeons understand, that fluids, extravasated in the abdomen admit of being discharged by an operation; it is also proper to explain the symptoms, denoting the cases, in which such a proceeding should be adopted.

In order to establish the signs, whereby we may be certainly assured, that a wound, penetrating into the abdomen, has been followed by extravasation, we must begin, says Petit, by distinguishing the subsequent symptoms from those which immediately accompany the wound, and which are, properly speaking, the true symptoms, because they are essentially owing to the division of the parts affected. The first consequences of this division, are pain, irritation, tension, convulsion, strangulation, and inflammation of the abdomen, the natural sources of the other succeeding symptoms, and which vary according to the situation of the wounded parts that are inflamed, and according to the degree of inflammation. Such are the hiccough, vomiting, costiveness, the suppression or retention of the bile and urine, a violent fever, which generally happens at the beginning, and when the inflammation is arrived to a certain degree, the concentration of the pulse, which is so low as scarcely to be perceived, faintings, cold sweats. These are the effects of the primary symptoms, which we observe every day in wounds of the abdomen.

When the succours of art are seasonably applied, we not only get the better of these symptoms, and stop their progress, but often entirely prevent them. Let us suppose therefore, that by proper management, the primary symptoms have been so far remedied, that, in four, six, eight, or ten days after the wound, they are entirely dissipated, or at least much abated: if, continues Mr. Petit, after an intermission of so many days, more or less, the same symptoms return, or with greater violence, without any apparent cause, we may confidently affirm, that these secondary or subsequent symptoms are owing to an extravasation.

One can scarcely be induced to believe at first, that there should be any secondary symptoms of the extravasation of blood; for, since the extravasation commences from the very moment of the wound, why do not these symptoms commence from that instant? And why do they not increase, in proportion as the blood diffuses itself in a larger quantity?

Petit has referred the reason to the following circumstances: blood extravasated in the abdomen, does not give rise to any particular complaints, either by the pressure, which it makes, or by its quality; and, whenever any symptoms are occasioned on the first occurrence of the effusion, they are those of weakness, depending upon the loss of blood to the circulation. The extravasation afterwards becomes entirely circumscribed by the adhesions, produced by the surrounding inflammation. An additional quantity of fluid continues to be secreted from the vessels into the encysted cavity of the effused blood, and, consequently, pain, inflammation, &c. are occasioned by the increased distention now brought on. I do not, however, deem Petit's theory of this subject of much importance; perhaps, it is inaccurate; but, the fact itself, that the symptoms of an extravasation in the abdomen are consecutive, is a piece of information highly interesting to the practitioner.

The foregoing observations are only an abstract of Petit's excellent memoir, which well merits to be attentively perused by every man, who follows the profession of surgery: it is, indeed, one of the most valuable of the essays published by the French Academy of Surgery. (See *Suite de l'Essai sur les Epanchemens par feu M. Petit le fils; in Mem. de l'Acad. de Chirurgie, Tom. 4. Edit. in* 12*mo.*)

Much of this subject is still more particularly considered in the article, *Abdomen*, to which the reader is referred.

EYE, Calculus in the interior of. Scarpa has dissected an eye, which was almost entirely transformed into a stony substance. It was taken from the body of an old woman, and was not above half as large as the other sound one. The cornea appeared dusky, and, behind it, the iris, of a very singular shape, was distinguishable, being concave, and without any pupil in its centre. The rest of the eyeball, from the limits of the cornea backward, was unusually hard to the touch.

On making an incision, Scarpa found the sclerotica and choroides, almost in their natural state, and a small quantity of limpid fluid issued from the anterior chamber of the aqueous humour. Beneath the choroides, two hard calculous concave plates presented themselves, united together by means of a complete membranous substance. One was situated forward; the other backward; the latter occupied the bottom of the eye; the former the situation of the corpus ciliare and crystalline lens.

Scarpa made an incision, through the compact membrane, which joined together the margins of the two calculous bodies. He found in the cavity, instead of the vitreous humour, some drops of a glutinous bloody fluid, and, in the longitudinal direction of this cavity, a little soft cylinder, which, extending forward from

the bottom of the eye, along the great axis of this organ, was inserted into a cartilaginous, elastic substance, situated in the centre of the front calculous body, precisely where, in the natural state, it is customary to find the lens, and its capsule, which were entirely wanting.

The posteriour surface of the iris had formed a firm adhesion to the middle of the cartilaginous substance, situated in the centre of the front calculus. Hence, the iris, when beheld on the side next the cornea and anteriour chamber appeared as it actually was, concave in the middle.

The optic nerve, which had degenerated into a mere thread, entered the sclerotica and choroides, as well as the centre, or bottom, of the posteriour calculous body, and lost itself in the little soft cylinder, which, as was explained, proceeded to be inserted into the cartilaginous substance, situated in the middle of the anteriour calculus, or the place naturally occupied by the lens, and its capsule. The greater part of this little cylinder, was, according to appearance, nothing else, than the membrane of the vitreous humour, destitute of fluid, shrivelled, and changed into a compact substance.

Haller met with a case similar to the foregoing one: "In furis cadavere, quod anno 1752 dissecuimus, diritas quidem non tanta, raritas autem major fuit. Cùm enim in eo homine nervos oculi sollicitè pararemus, cœcum fuisse eo latere, atque cicatricem in corneâ esse, et duritatem in oculo ispo adparuit. Cùm dissectione defuncti essemus, adparuit mira mali causa. Choroïdeæ membranæ suberat, retinæ loco, lamina ossea, aut lapidea, (nam fibras osseas nullas vidimus) cui ipsa choroïdea adhærebat, ut alias retinæ solet concentrica, hemispherio cavo similis, nisi quod duplici lamina fieret, et in altero latere duobus quasi localis excaveretur. Is quasi scyphus accuratè rotundo foramine perforabatur, quà nervus opticus subit, ut eò magis induratam retinam adpareret.

"Intra hanc osseam caveam nullum vitreum legitimum corpus, sed nervum, quasi albam, nempe cylindrum reperimus, quæ per foramen ossei cyathi transmissa metiens ejus diametrum, denique adhærebat osseo confuso corpori, quod potuisses pro corruptâ lente crystallinâ habere. Ei corpori undique et iris, et processus ciliorum cognomines, connascebantur, et cornea denique ad quam iris pariter conferbuerat. Nunc sive retinam, ut ego persuadeor, sive quidquam aliud fuisse velis, quod in os cavum et hemisphæricum mutatum sit, in oculo tamen tenerrimâ parte corporis indurationem perfectam natam esse adparet; nihil ergo in corpore nostro dari, quod indurari nequeat. Lapillos aliquos in lente crystallinâ repertos fuisse legi. Ejusmodi autem morbus, nescio an visus sit, qualem hæc opportunitas nobis obtulit." (Obs. Pathol. Oper. Min. Obs. 15.)

Fabricius Hildanus, Lancisi, as quoted by Heister, Morgagni, Morand, Zinn, and Pellier, make distinct mention of calculi in the interiour of the eye.

(*Scarpa sulle Malattie degli Occhi. Venezia.* 1802.)

EYE CANCER, *and Extirpation of.* Cancer of the eye may make its attack on both sexes, and at any period of life. It seems, however, that the disease is most frequent in childhood. Experience has shewn, that, at the Hôtel Dieu more than one-third of the patients, on whom Desault operated, were under twelve years of age. The complaint sometimes comes on after an obstinate ophthalmy; sometimes after a blow on the eye, after wounds, a staphyloma, and, often, after fungous excrescences, which form on the surface, or in the interior of the eye. The disease is said to have been caused by the imprudent employment of topical irritating applications; very frequently the causes are constitutional ones.

The following symptoms commonly indicate its attack, and accompany its progress. Head-achs, and an unusual heat in the organ, are the forerunners of the disease. An uneasy itching affects the eye and adjacent parts. The organ frequently weeps a great deal, and from being from the first irritably sensible of the impression of light, it soon becomes unable to bear it without pain, unless, indeed, some previous disease should have rendered the organ incapable of transmitting the rays of light to the retina. To the itching succeeds, at the end of a certain time, a pricking sensation, which is followed by a pain, that is not very acute at first, but, afterwards, becomes extremely poignant and lancinating. The eye enlarges, and assumes not the red colour of ophthalmy, but a dull hue, ending in a livid, yellowish, or blackish one. Sight becomes obstructed and destroyed; the pains grow more acute, and the size of the organ increases, not as in hydrophthalmy, according to its natural dimensions, but, by an unequal enlargement of its surface, which becomes rough and irregular. As the magnitude of the part increases, so does the hardness. The cornea, after turning whitish, reddish, and livid, ulcerates and bursts, and fungous growths project from the opening, discharging a purulent fetid sanies.

The disease continuing, a manifest

disproportion is seen between the eye and the orbit. As in hydrophthalmy, the organ projects out beyond the margin of this cavity, and forms a hideous prominence on the face. The portion of the conjunctiva, naturally reflected over the inside of each eye-lid, becomes separated in consequence of being dragged by the eye, to the front of which it applies itself, forming a reddish kind of band over it.

The suppuration puts on a more formidable aspect. The fungi increase, and become livid and dark-coloured. Hemorrhages follow, more or less frequently, and copiously. The pains, now more incessant, continually torment the patient, and, if art does not now interfere, the eye-lids next swell, inflame, and become scirrhous. The lower one, over which the sanies flows, is excoriated; fungi arise from it; and the disease is propagated to the cheek, and nose, so as to present, perhaps, one of the most terrible pictures, which external disease can form. The os planum or the os ethmoides is rendered carious, as well as the os unguis; the pituitary membrane is affected; the pains increase, and become general; and the cancerous diathesis afterwards makes its appearance.

The progress of the disease does not regularly follow the above course. It varies, according as a blow, a disease, or a cancerous disposition, has been the cause. It is enough to state here, however, that the patient is always brought to the grave by a terrible death, if the disease be not extirpated. As surgery possesses no means of curing this affliction, the only plan is to remove the part affected, and, practitioners, more timid in this, than other cases of cancer, never ventured to undertake the extirpation of the eye, till several ages, after they had done that of other cancerous parts.

The ancients are silent on this operation, and it is to the German surgery, that we are indebted for the first proposals of the kind. It was, for the first time, practised in the sixteenth century, with a very coarsely constructed instrument, shaped like a spoon, with cutting edges, and, by means of which, the eye was separated from the surrounding parts, and taken out of the orbit. But, this instrument, invented by Bartisch, was too large to reach to the deep contracted part of the orbit, so that either a part of the disease was left behind, or the thin delicate bones of the orbit were fractured, when the instrument was introduced too far. Fabricius Hildanus learnt these inconveniences from experience, and, to avoid them, devised a sort of probe-pointed bistoury; a better instrument, but not free from objections, and forgotten for near a century afterwards; surgeons continuing to use sometimes the above spoon, sometimes various kinds of hooks. Muys, Bartholine, &c. afford examples of operations so performed. Bidloo, more judicious, than his predecessors, made use of scissars, and a pointed bistoury. His mode of operating, though not very methodical, was crowned with several successes, a circumstance in its favour, as M. Louis has observed.

A lancet seemed to Lavauguyon sufficient for extirpating the eye, and he is the first French surgeon, who has spoken of this operation. All the surgeons of that country considered the operation, as useless, cruel, and dangerous, until St. Ives mentioned, that he had done it with success, without, however, describing the plan, which he followed. There are engraved, in the *Institut. Chirg.* two tumours of the kind now under consideration, which the author removed with the bistoury, alone, which he thinks quite sufficient, and preferable to the means employed by Bartisch, Hildanus, and Muys. Several English surgeons, have used a sort of curved knife, an engraving of which is given in B. Bell's system; but, in dissecting the tumour, this instrument is not so convenient, as a straight bistoury.

Thus far the plans of operating, advised by authors, were not guided by any fixed rules. M. Louis endeavoured to lay down such rules, and his method has, for a long while, been mostly adopted in France. It consists in dividing the attachments of the eye to the eye-lids; then those of the small oblique muscle; next, those of the great oblique muscle; then those of the levator palpebræ superioris, varying according to their insertions, the manner of holding the knife. The eye-ball is afterwards detached, and the four straight muscles, and optic nerve, divided with a pair of scissars.

This way of operating, founded upon anatomical principles, seems at first glimpse to offer a method, in which, as M. Louis remarks, each stroke of the instrument is guided by the knowledge of the parts. But it is to be noticed, that these parts, being altered by disease, most commonly do not present the same structure and relations, which they do in the natural state; and that the flattened, lacerated, destroyed muscles, on their being confused with the eye itself, cannot serve, as in lithotomy, for the foundation of any precept relative to the operation. Besides, why use both the knife and scissars? The latter instrument is obviously useless, though M. Louis seems to think the operation cannot be done without it. The inclination of the

outer side of the orbit will always allow a bistoury to be carried to the bottom of this cavity, so as to divide from above downwards, the optic nerve, and muscular attachments, which are to be drawn forward so as to render them tense.

Guided by the above principles, Desault, after having practised, and taught the method of M. Louis, returned to Heister's advice, who wishes only a bistoury to be employed. To have an exact idea of the mode of operating, which is always easy and simple with this one instrument, we must suppose the carcinoma to be in three different states. 1. When the tumour hardly projects out of the orbit, so that the eye-lids are free. 2. When it is much larger, projects considerably forward, and pushes in this direction the healthy eye-lids, which are in contact with it, together with a portion of the conjunctiva, which invests them, and is now detached from them. 3. When, in a much more advanced period, the eye-lids participate in the cancerous state. In the first case, the eye-lids must be separated from the eye, by cutting through the conjunctiva, where it turns to be reflected over the globe of the eye. In the second instance, the eye-lids and conjunctiva, which are in contact with the diseased eye, must be dissected from it. In the third, these parts must be cut away, together with the eye. (*Œuvres Chirurg. de Desault, par Bichat. Tom.* 2.)

After the above observations, it only seems necessary to annex a few brief directions for operating.

When the eye-ball is exceedingly enlarged, it is necessary to divide the eye-lids at the external angle, in order to facilitate the operation. The surgeon can in general operate most conveniently when he employs a common dissecting knife, and when his patient is lying down with his face exposed to a good light. In cutting out a diseased eye, it is necessary to draw the part forwards, regularly as its surrounding attachments are divided, in order that its connexions, which are still more deeply situated, may be got at with the knife. This object cannot be very well accomplished with the fingers, or forceps, and, therefore, most surgical writers recommend us, either to introduce a ligature through the front of the tumor, or to employ a hook, for the purpose of drawing the part in any direction, during the operation, which the necessary proceedings may require. When the eye-lids are diseased, they must be removed; but, when prudence sanctions their being preserved, this is an immense advantage. The eye must not be drawn out too forcibly, before the optic nerve is divided, and care must be taken not to penetrate any of the foramina, or thin parts of the orbit, with the point of the knife, for fear of injuring the brain. Great care should also be taken to leave no diseased parts behind, in the orbit. The hemorrhage may always be securely stopped by filling the orbit with scraped lint. It is constantly advisable to remove the lachrymal gland, as this part seems to be particularly apt to be the source of such inveterate fungous diseases, as too often follow the operation.

The antiphlogistic treatment is proper, for a few days afterwards. Sometimes, fungous granulations continually form in the orbit, notwithstanding they are repeatedly destroyed, and the patient is at last exhausted. Sometimes, the disease in the orbit extends even to the brain, and produces fatal consequences. When malignant fungous excrescences grow from the cornea alone, it is clearly unnecessary to extirpate the whole eye-ball.

For information, relating to the subjects of this article, consult particularly *Mémoire sur plusieurs Maladies du Globe de l'Œil; ou l'on examine particulièrement les cas qui exigent l'extirpation de cet organe, et la Methode d'y procéder; par M. Louis, in Mém. de l'Acad. de Chirurgie, Tom.* 13, *p.* 262. *Edit. in* 12*mo. Bertrandi, Traité des Opérations de Chirurgie, p.* 519, *Edit.* 1784, *Paris. Sabatier, de la Médecine Opératoire, Tom.* 3, *p.* 54, *Edit.* 1. *Richter's Anfangsgrunde der Wundarzneykunst, Band.* 3, *p.* 415, *Gottingen*, 1795. *Mémoire sur l'Extirpation de l'Œil Carcinomateux in Œuvres Chirurgicales de Desault par Bichat, Tom.* 2, *p.* 102. *Richerand, Nosographie Chirurgicale, Tom.* 2, *p.* 103, *&c. Edit.* 2. *Ware, in Transactions of the Medical Society of London, Vol.* 1, *part* 1, *p.* 140, *&c. Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 450. *Edit.* 1809. *Wardrop on Fungus Hæmatodes, p.* 93 *&c.*

EYE, DROPSY OF. See *Hydrophthalmy.*

EYE, INFLAMMATION OF. See *Ophthalmy.*

For other diseases of the eye, refer to *Amaurosis; Cataract; Cornea; Encanthis; Exophthalmia; Gutta Serena; Hemeralopia; Iris, Prolapsus of; Hypopium; Leucoma; Nyctalopia; Pterygium; Pupil, Closure of; Staphyloma, &c. &c.*

F.

FASCIA. (from *fascis*, a bundle, because, by means of a band, materials are collected into bundles.) A bandage, fillet, or roller. See *Bandage*.

FEVERS, SURGICAL. Under this head we comprehend two species of fever, viz. the *inflammatory*, and the *hectic*, which are particularly interesting to surgeons, because frequently attendant on surgical disorders.

We have mentioned, in treating of inflammation, that a febrile disturbance of the constitution is attendant on every considerable inflammation. In the present article, we shall endeavour to give some account of the particulars of this disorder.

The fever about to be described, is known and distinguished by several names; some calling it *inflammatory*; some *symptomatic*; and others *sympathetic*. It is sometimes idiopathic; that is to say, it occasionally originates at the same time with the local inflammation, and from the same causes. (*Burns.*) In other instances, and, indeed, we may say, in all ordinary surgical cases, it is symptomatic; or, in other words, it is produced, not directly by the causes, which originally produced the inflammation, but in consequence of the sympathy of the whole constitution for the disturbed state of a part.

The idiopathic inflammatory fever is said to be always preceded by chilliness. The symptomatic, or sympathetic inflammatory fever, sometimes takes place so quickly, in consequence of the violence of the exciting cause, or of the local inflammation, that no preceding coldness is observable. If, however, the local inflammation be more slowly induced, and, consequently, operate more gradually on the system, then the coldness is evidently perceived. The symptomatic fever, induced by scalding, or burning a part, is quickly produced, and we have very little time to attend to the period of formation. On the other hand, the symptomatic fever, induced by wounds, is excited more slowly, and the period of formation is longer. This fever is not produced, when the inflammation only affects parts in a slight degree; but, it consequently makes its appearance, if the local inflammation be considerable, or if it affect very sensible parts. (*Burns.*)

The degree, in which this fever is excited, does not altogether depend upon the absolute quantity, or violence of the inflammation; but, in a great measure, upon the degree of the local inflammatory action, compared with the natural power and action of the part affected. Parts, in which the action is naturally low, are extremely painful when inflamed, and the system sympathizes greatly with them. Hence, the constitution is very much affected, when tendons, bones, or ligaments, are the parts inflamed. Severe inflammation of a large joint, every one knows, is apt to excite the most alarming, and even fatal derangement of the system. When very sensible parts are inflamed; for instance, the eye; the symptomatic fever is generally more considerable, than it would be, were it to arise from an equal quantity and degree of inflammation in a less sensible organ.

In common parts, as muscles, cellular membrane, skin, &c. the symptoms will be acute; the pulse strong and full, and the more so, if the inflammation be near the heart; but, perhaps, not so quick, as when the part is far from it. The stomach will sympathize less, and the blood will be pushed farther into the small vessels. (*Hunter.*)

If the inflammation be in tendinous, ligamentous, or bony parts, the symptoms will be less acute, the stomach will sympathize more, the pulse will not be so full, but, perhaps, quicker; there will be more irritability, and the blood will not be so much pushed into the small vessels, and, therefore, it will forsake the skin. (*Hunter.*)

It seems to be a material circumstance, whether the inflammation is in the upper, or lower extremity; that is, far from, or near to the heart, for the symptoms are more violent, the constitution more affected, and the power of resolution less, when the part inflamed is far from the source of the circulation, than when near it, even when the parts are similar, both in texture and use. (*Hunter.*)

If the heart, or lungs, are inflamed, either immediately, or affected, secondarily, by sympathy, the disease has more violent effects upon the constitution, than the same quantity of inflammation would have, if the part affected were not a vital one, or one with which the vital parts did not sympathize. If the part be such as the vital ones readily sympathize with, then the sympathetic action of the latter will affect the constitution, as in an inflammation of the testicle. (*Hunter.*) In such cases, the pulse is much quicker and smaller, and the blood is more sizy than if the inflammation were in a common part, such

as muscle, cellular membrane, and skin. (*Hunter.*)

When the stomach is inflamed, the patient feels an oppression and dejection through all the stages of the inflammation; the pulse is generally low and quick, and the pain obtuse, strong, and oppressing; such as the patient can hardly bear. If the intestines are much affected, the same symptoms take place, especially if the inflammation be in the upper part of the canal; but, if only the colon be affected, the patient is more roused, and the pulse is fuller, than when the stomach only is inflamed. When the uterus is inflamed, the pulse is extremely quick and low. When the inflammation is either in the intestines, testicle, or uterus, the stomach generally sympathizes. In inflammation of the brain, the pulse varies more, than in the same affection of any other part; and, perhaps, we must, in this instance, form a judgment of the complaint, more from other symptoms, than the pulse. (*Hunter.*)

When the inflammation is situated in a part, not very essential to life, and occasions the general affection of the system, called inflammatory fever, the pulse is fuller and stronger, than common, and the blood is pushed further into the extreme arteries, than when the inflammation is in a vital part. The patient, after many occasional rigors, is at first rather roused. The pulse is, as above described, when the constitution is strong and not irritable; but, if this be extremely irritable and weak, as in many women, who lead sedentary lives, the pulse may be quick, hard, and small, at the commencement of the inflammation, just as if vital parts were concerned. The blood may also be sizy; but it will be loose and flat on the surface. (*Hunter.*)

We may set down the ordinary symptoms of the inflammatory fever, occurring in consequence of local inflammation in common parts, and in a healthy habit, as follows: The pulse is frequent, full, and strong; all the secretions are diminished; the patient is vigilant and restless; the perspiration is obstructed, and the skin is hot and dry; the urine is high-coloured, and small in quantity; the mouth is parched, and the tongue furred; there is an oppressive thirst experienced; disturbance of the nervous system; loss of appetite and sleep; and, in some cases, delirium.

OF WHAT IS TO BE DONE FOR THE RELIEF OF THE INFLAMMATORY FEVER.

Upon this part of the subject very little is to be said; for, as the febrile disturbance of the system is produced, and entirely kept up, in almost every instance, by the local inflammation, it must be evident, that the means employed for diminishing the exciting cause, are also the best for abating the constitutional effects. Hence, it very seldom happens, that any particular measures are adopted expressly for the fever itself; as this affection is sure to subside in proportion as the local inflammation is lessened, or resolved. But, when the febrile disturbance is considerable, and the inflammation itself is also considerable, the agitated state of the system may have in its turn a share in keeping up, and even increasing, the local affection, and should be quieted as much as possible. However, in these very instances, we should, in all probability, be led to a more rigorous adoption of the antiphlogistic plan of treatment, from an abstract consideration of the state of the local inflammation itself, without any reference to that of the constitution. Indeed, the increased action of the heart and arteries, and the suppression of the secretions, require the employment of antiphlogistic means, and antimonials, the very same things, which are indicated for the resolution of the local inflammation itself. Bleeding, purging, cold drinks, low diet; the exhibition of the antimonium tartarizatum, James's powder, or the common antimonial powder; and bathing the feet and body in warm water, are measures, which have the greatest efficacy in tranquillizing the constitutional disturbance implied by the term inflammatory fever. But, I think it right to repeat, that it is hardly ever necessary to have recourse to such an evacuation as general bleeding, merely on account of the fever; as this is only an effect, which invariably subsides, in proportion as the local cause is diminished.

HECTIC FEVER.

The sympathetic, or symptomatic fever already described, is an *immediate* affection of the constitution, in consequence of some local disorder; the hectic fever is a *remote* one. When the hectic fever is a consequence of local disease, it has commonly been preceded by inflammation and suppuration; but, there is an inability to accomplish granulation and cicatrization: and the cure, of course, cannot be accomplished. The constitution may now be said to be oppressed with a local disease, or irritation, of which it cannot relieve itself.

A distinction should be made, between a hectic fever, arising entirely from a local complaint in a good constitution, which is only disturbed by too great an irritation, and a hectic fever, arising principally from the badness of the constitu-

tion; which does not dispose the parts to heal. In the first species, it is only necessary to remove the part (if removable), and then all will do well; but, in the second, nothing is gained by a removal of the part, unless the wound, made in the operation, is much less, and more easy put into a local method of cure; by reason of which, the constitution sinks less, under this state and the operation together, than under the former one. Here the nicest discrimination is requisite. (*Hunter.*)

The hectic fever comes on at very different periods after the inflammation, and commencement of suppuration, owing to a variety of circumstances. Some constitutions, having less powers of resistance, than others, must more easily fall into this state.

The hectic fever takes its rise from a variety of causes, but, which have been divided into two species, with regard to diseased parts; viz. parts called vital, and others not of this nature. Many of the causes of hectic fever, arising from diseases of the vital parts, would not produce this constitutional affection, if they were in any other part of the body; such, for instance, is the formation of tumours, either in, or so as to press upon, a vital part, or one, whose functions are immediately connected with life. Scirrhi in the stomach, and mesenteric glands; diseased lungs, liver, &c. produce hectic fever very soon.

When hectic fever arises from a disease of a part, that is not vital, it commences sooner, or later, according as it is in the power of the part to heal, or continue the disease. If the part be far from the source of the circulation, the fever will come on sooner, with the same quantity of disease. When the disease is in parts, which are not vital, and excites hectic fever, it is generally in situations, where so much mischief happens as to affect the constitution, and where the powers of healing are little. This is the case with diseases of most joints. We must also include parts, which have a tendency to such specific diseases, as are not readily cured in any situation.

Although hectic fever commonly arises from some incurable local disease of a vital part, or of an extensive disease of a common part, yet it is possible for it to be an original disease in the constitution, without any local cause whatever, that we know of.

Hectic is a slow mode of dissolution: the general symptoms are those of a low, or slow fever, attended with weakness. But, there is rather weak action, than real weakness; for, upon the removal of the hectic cause, the action of strength is immediately produced, and every natural function is re-established, however much it was impaired before.

The particular symptoms are debility; a small, quick, and sharp pulse; the blood forsakes the skin; loss of appetite; frequently, a rejection of all aliment from the stomach; wasting; a great readiness to be thrown into sweats; spontaneous perspirations, when the patient is in bed; the urine is pale-coloured, and very copious; and there is often a constitutional purging.

Hectic fever has been imputed to the absorption of pus into the circulation; but, this cause has been much exaggerated, as concerned in occasioning many of the bad symptoms, which frequently attack persons, who have sores. The hectic fever almost constantly attends suppuration, when in particular parts, such as vital ones. It also attends many inflammations, before actual suppuration takes place, as in cases of white swelling of the large joints. The same quantity and species of inflammation and suppuration in any of the fleshy parts, especially such as are near the source of the circulation, have in general no such effect. Hence, in the first instances, the fever is only an effect on the system, produced by a local complaint, that has a peculiar property.

The constitution sympathizes more readily with diseases of vital parts, than with those of any other parts; their diseases are also in general more difficult of cure, than the same affections of parts, which are not vital. All diseases of bones, ligaments, and tendons, affect the constitution more readily than those of muscles, skin, cellular membrane, &c.

When the disease is in vital parts, and is such as not to kill, by its first constitutional effects, the system then becomes teazed with a complaint, which is disturbing the *necessary actions of health*. In the large joints, a disease continues to harass the constitution, by attacking parts, which have no power, or rather, no disposition to produce a salutary inflammation and suppuration. Thus, the system, is also irritated by the existence of an incurable disease. Such is the theory of the cause of hectic fever.

If the absorption of matter always produced the symptoms, above described, how could any patient, who has a large sore, possibly escape becoming hectic? for, there is no reason to suppose, that one sore can absorb more readily than another. If absorbed matter occasioned such violent effects as have been commonly ascribed to it, why does not venereal matter do the same? We often know, that absorption is going on, by the progress of buboes. A large one, just on the point of bursting,

has been known to be absorbed, in consequence of a few days' sea-sickness. The person continued at sea for four and twenty days afterwards; yet, no hectic symptoms followed, only the specific constitutional effects, which are of a very different description.

Matter is sometimes formed on the inside of the veins, when their cavities are inflamed, and this matter cannot fail to get into the circulation; yet, hectic symptoms do not arise. Also, very large collections of matter, which have been produced without visible inflammation, as many abscesses of the scrophulous kind, are wholly absorbed, in a very short time, but no bad symptoms are the consequence. (*Hunter.*)

Hence, we may conclude, that the absorption of pus has no share in occasioning hectic fever. Many arguments might be adduced to shew the absurdity of the doctrine; but, we can here only refer the reader to what Mr. Hunter has said farther on the subject, in his work on inflammation.

It is much more probable, that the hectic fever arises from the effect, which the irritation of a vital organ, or other parts, such as joints, have on the constitution, when either incurable in themselves, or are so for a time to the constitution. (*Hunter.*)

TREATMENT OF HECTIC FEVER.

We have no method of curing the consequences above related. All relief must depend on the cure of the cause, (viz. the local complaint) or on its removal.

Tonic medicines have been recommended, on account of the evident existence of great debility. Antiseptics have also been given, in consequence of the idea that, when pus is absorbed, it makes the blood disposed to putrify. For these reasons, bark and wine have been exhibited.

Bark will, in most cases, only assist in supporting the constitution. Until the cause is removed, however, there seems no prospect of curing a disorder of the constitution. It is true, tonic medicines may make the system less susceptible of the disease, and also contribute to diminish the cause itself, by disposing the local complaints to heal. When, however, the hectic fever arises from a specific disease, such as the venereal, though bark may enable the constitution to bear the local affection better, than it otherwise could do, yet, this medicine can never remove the syphylitic mischief. (*Hunter.*)

No medicine, not even bark itself, has any direct power of communicating strength to the human constitution. All that can be done, in the treatment of hectic fever, when it is thought inexpedient, or impracticable, to remove the morbid part, is to combat particular symptoms, and to promote digestion. It is by bringing about the latter object, that bark is useful in these cases. The infusum cinchonæ being more apt to agree with the stomach, than the decoction, or powder, should generally be preferred. Nourishing food, easy of digestion, should be frequently taken, in small quantities at a time. Nothing is more prejudicial to a weak constitution, than over-loading the stomach. Wine may also be given, but not too freely, and, not at all, if it should create heartburn, as it sometimes does in hectic patients. Madeira is less apt to have this disagreeable effect, than port. In these cases, it is likewise often found useful to administer gentle cordial aromatic draughts. But, of all medicines, opium is perhaps the most valuable to those, who are afflicted with hectic fever; it alleviates pain, procures sleep, and checks the diarrhœa, which so frequently attends such cases.

When the local complaint, connected with the fever, is totally incurable, it must, if possible, be removed by a manual operation. Thus, when a diseased joint keeps up hectic fever, and seems to present no hope of cure, amputation must be performed. But, when the local disease holds forth the chance of being cured, provided the state of the constitution were improved, the surgeon is, in this circumstance, to endeavour to support the patient's strength. Great discretion, however, must be exercised, in deciding how long it is safe to oppose the influence of an obstinate local disease over the system, by the power of medicine. Although patients, in an abject state of weakness, have oftentimes been restored to health by a removal of the morbid part, yet many have been suffered to sink so low, that no future treatment could save them from the grave. Clemency in the practice of surgery, does not consist so much in delaying strong and vigorous measures, as in boldly deciding to put them in execution, as soon as they are indicated.

When the hectic fever arises from local diseases in parts, which the constitution can bear the removal of, the morbid part should be taken away, if it cannot be cured, consistently with the advice already given. When the disease arises from some incurable disease, in an extremity, all the abovementioned symptoms cease, almost immediately after the limb has been taken off. A hectic pulse, at one hundred and twenty, has been known to sink to ninety in a few hours after the removal of the hectic cause. Persons have been known to sleep soundly the

first night afterwards, who had not slept tolerably for weeks before. Cold sweats have stopped immediately, as well as those, called colliquative. A purging has immediately ceased, and the urine begun to drop its sediment. (*Hunter.*)

FIBULA. (*quasi figilula*, from *figo*, to fasten.) So named from its resemblance to a Roman clasp. The small bone of the leg. See *Fractures and Dislocations.*

FICATIO, or FICUS. (a fig.) A tubercle about the anus, or pudenda, resembling a fig.

FINGERS, ABSCESSES OF. See *Whitlow.*

FINGERS, *Amputation of.* See *Amputation.*

FINGERS, *Caries of.* In these cases, the surgeon is to endeavour to extract the exfoliating portions of bone, immediately they become loose. For this purpose, he is justified in making such incisions, as will enable him to fulfil the object in view. Until the process of exfoliation is sufficiently advanced, he can do little more, than apply simple dressings, and keep the part in a clean quiet state.

When the separation of the dead pieces of bone will certainly destroy the utility of the finger, and convert the part into, an inconvenient, stiff appendage to the hand; or, when the patient's health is severely impaired by the irritation of the disease, the termination of which cannot be expected, within a moderate space of time; amputation is proper. It is a truth, however, that many fingers are amputated, which might be preserved, and surgeons ought to consider well, before presuming to remove parts, which, when curable, may become of the greatest consequence, in regard to the perfection of the hand. The bread of many persons, it is well known, depends on the unmutilated state of certain fingers. These remarks are offered, because I have seen several surgeons, fond of seizing every opportunity of cutting their fellow creatures, remove fingers, which might have been usefully saved, either, by allotting a little more time for the exfoliation, or by making incisions, and cutting out the dead piece of bone.

FINGERS, *Dislocations of.* See *Dislocation.*

FINGERS, *Fractures of.* See *Fracture.*

FINGERS SUPERNUMERARY. Children are occasionally born with more fingers, than are natural, and since allowing the redundant number to remain would keep up deformity, and create future inconvenience, the surgeon is called upon to amputate them. The redundant fingers are sometimes with, sometimes without, a nail; are seldom more numerous, than one upon each hand; are generally situated just on the outside of the little fingers; and, as far as my observation extends, are incapable of motion, in consequence of not being furnished, like the rest of the fingers, with muscles. The best plan is to cut off supernumerary fingers with a scalpel, at the place, where they are united to the other part of the hand. The operation should be performed, while the patient is in the infant state, that is to say, before the superfluous parts have acquired much size, and while the object can be accomplished with the least pain. The incisions ought to be made, so as to form a wound with edges, which will admit of being brought together with strips of adhesive plaster. As soon as the dressings are applied, the hemorrhage will almost always cease, without a ligature.

FISSURE. (from *findo*, to cleave asunder.) A very fine crack in a bone, has this term often applied to it. See *Fracture.*

FISTULA, in surgery, strictly means a sore, which has a narrow orifice, runs very deeply, is callous, and has no disposition to heal. The name is evidently taken from the similitude, which the long cavity of such an ulcer has to that of a pipe or reed. A fistula commonly leads to the situation of some disease keeping up suppuration; and from which place the matter cannot readily escape. No technical term has been more misapplied, than this; and no mis-interpretation of a word has had worse influence in practice, than that of the present one. Many simple, healthy abscesses, with small openings, have too often been called *fistulous*; and, being considered as in a callous state, the treatment pursued has in reality at last rendered them so, and been the only reason of their not having healed.

FISTULA IN ANO. See *Anus.*

FISTULA LACHRYMALIS. A disease arising from an obstruction in the ductus nasalis, and preventing the tears and mucus of the lachrymal parts of the eye from descending into the nose.

No one can have a proper conception of this disorder, without adverting to the anatomy, and functions, of the parts concerned. Hence, I shall first insert the interesting relation of these subjects, as delivered by Mr. Pott.

"That the motions of the eyelids may be performed with the utmost ease, that the tunica cornea may be kept constantly clean, bright, and fit for the transmission of the rays of light, and that dust, and other hurtful particles, may be immediately washed away, the surface of the eye is continually moistened by a fine limpid fluid.

"This fluid is derived principally from a large gland, situated under the upper

edge of the orbit, near the outer corner of the eye, which gland is of the conglomerate kind, and lies in a small depression of the os frontis; its excretory ducts, or those by which it discharges the secreted fluid, piercing the tunica conjunctiva, just above the cartilaginous borders of the upper eyelids.

"While the caruncle was thought to be the secretory organ of the tears, this gland bore the title of glandula innominata; but now, that its use and office are known, it is called glandula lachrymalis.

"By irritation from any sharp or poignant particles, a large quantity of this fluid is immediately secreted, and by the motion of the eyelids is as immediately derived over the surface of the eye, by which means such particles are washed and wiped off. Sometimes also the passions of the mind produce an immediate increase of this lymph, which is then strictly and properly called tears; a constant secretion of too large a quantity causes a disease, called epiphora; and a deficiency of it makes the motions of the lid difficult and painful.

"Although the fluid secreted by the lachrymal gland is considerable in quantity, yet, when it is not suddenly produced by irritation from without, or passion within, it is so constantly and gradually carried off, as to create neither trouble, uneasiness, nor blemish.

"The edge, or border of each eyelid, is formed by a thin cartilage, the figure and consistence of which keep the lids properly expanded; these cartilages are covered by a fine membrane, and are called cilia; their internal edges do, upon every motion, sweep over every point of the surface of the cornea; this motion, though almost imperceptible, unless attended to, is very frequently performed; and as the secretion of the fluid is also constant, the eye is by this means kept always moist, clean, and bright.

"At the extremity of each of these cartilaginous borders of the eyelids, on the side next the nose, is a small papilla, or eminence; and in the middle of each of these is a small hole, or perforation, which being made in the cartilage, is not liable to collapse while the parts are in a sound state, but remains always open; they are called the puncta lachrymalia; and their office is to receive the lachrymal fluid, as it runs off the cornea along the edges of the eyelids, thereby preventing it from trickling down the cheek; and that there may be no impediment to the constant execution of this office, during the time of sleep, as well as that of being awake, the internal edges of the cilia do not come into immediate contact with each other in that point where these orifices are.

"From each of these puncta lachrymalia proceeds a small membranous tube; which tubes soon enter into, or form a pouch or bag, situated near the inner angle of the eye, just below the union of the two lids, under the musculus orbicularis palpebrarum; the bag is called the sacculus lachrymalis, and its office is to receive all the lymph brought by the puncta and ducts; the upper part of this sacculus lies in an excavation, formed partly by the nasal process of the os maxillare superius, and partly by the os unguis; the lower part of it is confined in a long channel, and forms a tube, or duct, which descending obliquely backward, communicates with the cavity of the nose, behind the os spongiosum superius, by an opening whose size is somewhat different in different subjects.

"This passage is called the ductus ad nares or the ductus nasalis, and through it whatever is received by the sacculus from the puncta does, in a healthy and sound state of these parts, pass into the nose.

"The membrane which lines this sacculus and duct, is in its structure much like to the membrana pituitaria narium, from the surface of which a clear viscid mucus is secreted, and by which the sacculus and passages are constantly moistened and kept pervious.

"While the parts are in a healthy, sound state, the fluid secreted by the lachrymal gland passes off through the puncta, sacculus, and duct, into the nose, without any trouble; but when they are in a diseased state, the case is otherwise. This membrane, like all other vascular parts, is liable to inflammation, by which means it often happens, that it is so thickened as to obstruct the nasal duct, and thereby much impede, or totally hinder the passage of any thing through it; in consequence of which obstruction the sacculus is filled by its natural mucus, and the derivation of the serum from the lachrymal gland through it being thus prevented, it runs off from the eyelid down the cheek; this obstruction continuing, and the mucus still lodging, the sacculus is dilated, and produces that tumour in the inner corner of the eye, and that discharge, upon pressure, which characterize the first state of the disease in question, and, in conjunction with several other attending symptoms, prove its seat to be in the lachrymal sac, and nasal duct.

"Although the seat of this disease is the same in almost every subject, yet its appearance is very different in different persons, and under different circumstances. These variations depend principally on—

1. The degree of obstruction in the nasal duct.
2. The state of the cellular membrane covering the sac.
3. The state of the sacculus itself.
4. That of the bone underneath.
5. The general state and habit of the patient.*

"Sometimes a serous kind of defluxion, by which the lining of the sac and duct are so thickened as to obstruct, or prevent the passage of the fluid through them into the nose, makes the whole complaint; and the cellular membrane on the outside not being diseased, there is no appearance of inflammation. In this case the duct is stopped, and the sacculus dilated, but without any alteration in the colour of the skin; a fulness appears in the corner of the eye next to the nose; and upon the application of a finger to this tumour, a clear viscid mucus is discharged through the puncta lachrymalia; the patient feels no pain, nor finds any inconvenience, except what is produced by the discharge of this mucus, and by the trickling of the lymph down the cheek.

"In some cases the mucus is not perfectly and always clear, but is sometimes cloudy, and looks as if it had a mixture of milk or cream in it; at first waking, some of it is generally found in the corner of the eye; and the eyelashes, being smeared over with it during sleep, most commonly adhere together in the morning.

"This is the most simple state of the disease, what the French have called the hernia, or hydrops sacculi lachrymalis: it is frequently met with in children who have been rickety, or are subject to glandular obstructions; and in this state it sometimes remains for some years, subject to little alterations, as the health or habit shall happen to vary, the sacculus being sometimes more, sometimes less full, and troublesome; the mucus which is pressed out, is sometimes more, sometimes less cloudy, and now and then it is attended with a slight ophthalmy, or an inflammation of the eyelids, but which, by common care, is easily removed.

"If the sacculus is not much dilated, the discharge small, and produced only by pressure, the chief inconveniences are the weeping eye, and the gumming together of the lids, after sleeping: but these, by being attended to, may be kept from being very troublesome; and, if the disease makes no farther progress, may be so regulated as to render any more painful process totally unnecessary.

"If the dilation is considerable, the swelling is more visible, and the quantity of mucus is larger; it is also in this state more frequently mixt and cloudy, and more troublesome, from the more frequent necessity of emptying the bag; but if the patient be adult, it may, even in this more dilated state of it, be kept from being very inconvenient.

"If an inflammation comes on, the tumour is thereby considerably increased, the discharge is larger, as well during sleep as upon pressure; the skin covering it loses its natural whiteness and softness, becomes hard, and acquires an inflamed redness; and with the mucus a mixture of something, which in colour resembles matter, is discharged, especially if the pressure be made with any force, or continued for any time: this circumstance, added to the painful sensation, and inflamed appearance of the parts, has been productive of a supposition, that in this state there is either an ulcer or an abscess within the sacculus or duct."

Mr. Pott next attempts to prove, that the contents of the sac are only of a mucous, not a purulent, quality.

On quitting this discussion, Mr. Pott remarks, "The inflammation of the cellular membrane covering the sac, is a circumstance which makes a considerable difference, both in the appearance of the disease, and in its requisite treatment; in some cases it is confined merely to the surface of the tumour in the corner of the eye; in others it spreads still farther, affecting the eyelids, cheek, and side of the nose.

"When the parts are in this state, the mucus within the bag has generally the appearance of being matter, that is, it wears a deep yellow colour, and is of a more thin consistence; if the puncta lachrymalia are naturally large and open, and the inflammation confined to the surface of the sac, its contents will pass off pretty freely, and the skin will remain entire; this is what the ancients called the simple, or imperfect, anchylops.

"But when the skin covering the lachrymal bag has been for some time inflamed, or subject to frequently returning inflammations, it most commonly happens, that the puncta lachrymalia are affected by it, and the fluid not having an opportunity of passing off through them, distends the inflamed skin, so that at last it becomes sloughy, and bursts externally. This is that state of the disease which is called perfect aigylops, or ægylops; the discharge which used to be made through the puncta lachrymalia,

* As the state and circumstances of this disease are really various, and differ very essentially from each other, the general custom of calling them all by the one name of fistula lachrymalis is absurd.

while the skin was entire, is now made through the new opening; and, by excoriating the eyelids and cheek, increases the inflammation, and gives the disease a much more disagreeable appearance. In some, the matter bursts through a small hole, and after it has discharged itself, the tumour subsides, the neighbouring parts become cool, and though the skin covering the surface of the sacculus is sloughy and foul, yet there is no reason to believe that the sac itself is much diseased below; in others, the breach is large, the skin remains hard and inflamed, and from the appearance of the sore, there is reason to suppose the whole inside of the bag to be in a diseased state; and in some cases, which have been much neglected or irritated by ill treatment, the cavity of the sacculus seems to be filled with a loose illnatured fungus, which gleets largely, and produces inflammation and excoriation of all the parts about.

"There is also another circumstance which sometimes is found to attend this disorder, viz. a carious state of the bones. This was by our forefathers supposed to be a frequent one, and was the principal reason for their so free use of caustic, cautery, and scalpra, in the treatment of it; but since the disease has been more minutely examined into, this circumstance has been found to be a very rare one. When the fistula lachrymalis is a symptom of the lues venèrea, as it sometimes is, the bones are indeed often carious; but then, the fistula is not the original complaint, but produced secondarily, and is a consequence of the diseased state of the os ethmoides, and ossa spongiosa of the nose, and is not curable by any local means or applications, but depends entirely on the cure of the disease of which it is a symptom.

"I have also seen an abscess after the small-pox, which, by falling on the lachrymal bag, has made it all slough away, and leave the bones bare; which circumstance I have also seen attend the free use of strong escarotics applied to destroy what is called the cyst; but without the accession of some other disorder producing it, or the most absurd method of treating the complaint, I believe that a caries of the bones will very seldom be met with. Indeed, the combination of other diseases, either of the general habit, or affecting the same, or the neighbouring parts, does often make a very material difference, both in the appearance of the disorder, in the prognostic, and in the proper method of treating it, which therefore should always be inquired into; for instance, the patient is sometimes subject to an habitual ophthalmy, or lippitudo, which will add to the deformity, and give a good deal of additional trouble during the cure; an ozœna, or some other disease of the membrane, and cells of the ethmoid bone, or a polypose excrescence within the nose, are now and then combined with it; the habit is sometimes, as I have before observed, infected with the lues venerea, of which this disease may be a symptom; strumous glandular obstructions are its too frequent companions; and, what is worst of all, it is sometimes cancerous."

TREATMENT OF THE FIRST STAGE OF THE FISTULA LACHRYMALIS.

Mr. Pott continues: "From what has been said, I think it will appear that this disease, in its primary and most simple state, consists in a detention or lodgment of mucus in the sacculus lachrymalis, in consequence of an obstruction of the natural passage from that bag into the nose; that by means of this lodgment the sacculus is distended, irritated, and sometimes inflamed; that the fluid which passes from the lachrymal gland over the eye to the puncta lachrymalia, being prevented by the fulness of the sac from getting into it, runs down the cheek; and therefore that the characteristic marks of the disorder, when recent, are a small tumour in the corner of the eye, an involuntary flux of serum down that side of the face, and a discharge of mucus through the puncta lachrymalia upon pressure.

"This lodgment, being originally produced by the stoppage of the natural duct, it follows, that the first curative intention is, the removal of that obstruction; which is sometimes practicable, but more often not; the degree of obstruction, its date, the state of the adjacent parts, and some other circumstances, rendering it more or less so in different subjects.

"That the inexperienced practitioner may be guarded against giving a hasty prognostic, or making attempts, which, however fatiguing to the patient, must in the end prove fruitless; and that he may be enabled to understand the disease more perfectly, I shall take the liberty to divide it into four general heads, or states, under which all its lesser distinctions may be comprehended.

"The first consists in a simple dilatation of the sacculus, and obstruction of the nasal duct, discharging upon pressure a mucus either quite clear, or a little cloudy; the skin covering the bag being entire and perfectly free from inflammation.

"In the second, the tumour is somewhat larger; the skin which covers it is in an inflamed state, but entire; and the

discharge made through the puncta lachrymalia is of a pale yellow, or purulent colour.

"In the third, the skin covering the sacculus is become sloughy and burst, by which means the swelling is in some measure lessened; but the mucus, which while the skin was entire, used to be pressed out through the puncta lachrymalia, now discharges itself through the new aperture; the ductus ad nares, both in this and the preceding state, are not otherwise diseased, than by the thickening of its lining.

"In the fourth, the passage from the sacculus lachrymalis into the nose is totally obliterated, the inside of the former being either ulcerated, or filled up with a fungus, and attended sometimes with a caries of the bone underneath."

Our limits oblige us to pass over what Mr. Pott next states, concerning the practice of the ancients.

"In the first and most simple state of the disease, viz. that of mere obstruction, without inflammation, much pains have been taken to restore the parts to their natural state and use, without making any wound or division at all; the introduction of a probe, the injection of a fluid, and a constant compression made on the outside of the sacculus in the corner of the eye, are the principal means by which this has been attempted.

"Some few years ago, M. Anel made a probe of so small a size as to be capable of passing from the eyelid into the nose, being introduced at one of the puncta lachrymalia, and passing through the sacculus and duct; with which probe, he proposed to break through any small obstruction, which might be found in its passage.

"He also invented a syringe, whose pipe is small enough to enter one of the puncta, and by that means to furnish an opportunity of injecting a liquor into the sacculus and duct; and with these two instruments he pretended to be able to cure the disease whenever it consisted in obstruction merely, and the discharge was not much discoloured. The first of these, viz. the passage of a small probe through the puncta, has a plausible appearance, but will, upon trial, be found very unequal to the task assigned; the very small size of it, its necessary flexibility, and the very little resistance it is capable of making, are manifest deficiencies in the instrument; the quick sensation in the lining of the sac and duct, and its diseased state, are great objections on the side of the parts, supposing that it was capable of answering any valuable end, which it most certainly is not.

"That the passing a fine probe from one of the puncta lachrymalia into the nose is very practicable, I know from experience; but I also know from the same experience, that the pain it gives, and the inflammation it often excites, are much greater, than any benefit, which does or can arise from it.

"It is said that the principal use of this probe is to clear the little ducts leading from the puncta into the sacculus, and the obstruction of those ducts is often mentioned as a part of this disease; by which one would be led to suppose that it was a circumstance which frequently occurred, whereas it is seldom if ever met with, and when it does happen, can never produce the disease in question; the principal characteristic of which is, a discharge into the inner corner of the eye upon pressure made in the angle; this discharge is made from the sacculus, through the puncta, and proves that the latter are open; the passing a probe therefore through these seems to be perfectly unnecessary, since a stoppage of them would never give rise to that disease, which consists in an obstruction to the passage of any thing from the sac into the nose, and not from the eye into the sac.

"The syringe, if used judiciously while the disease is recent, the sac very little dilated, and the mucus perfectly clear, will sometimes be found serviceable; I have used it where, I think, it has been much so; I have by means of it injected a fluid through the sacculus into the nose, and in two or three instances have effected cures by it; but I have also often used it ineffectually; it gives no pain, and a few trials render the use of it very little troublesome."*

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* The following passage will shew, that the practice of Anel, was first received with much envy and opposition, and that every attempt has been made to strain sentences in old works beyond their allowable meaning, so as to lessen the merit of the proposal, and deprive it of the recommendation of originality. Cette manière de traiter la fistule lachrymale n'étoit point connue lorsque Anel l'a exécutée. Cependant elle ne paroît pas entierement nouvelle; Pline le jeune parle, dans le lib. 7, cap. 53, de son Histoire naturelle, d'un certain Caius Julius, Médecin, qui traitoit quelques maladies des yeux, avec des stylets qu'il introduisoit dans l'oeil. *Specillum per oculos trahens dum mungit specillum per oculos trahens.* Ces passages n'ont point échappé au savant Morgagni, qui les rapporte dans sa sixieme adversaire, *animad.* 74, ou il parle de la méthode d'Anel. La méthode d'injecter les points lacrymaux ne lui a pas paru parfaitement nouvelle. Plater parle d'une fille attaquée de la fistule la-

The screw, invented by Fabricius ab Aquapendente, for compressing the lachrymal sac, being now never used, we need not follow Mr. Pott in shewing its inapplicableness.

Mr. Pott continues; "Besides these means of attempting a cure without incision, the gentlemen of the French Academy have favoured us with some others, such as the introduction of a probe into the lower part of the nasal duct within the nose, the injection of a fluid by the same orifice, the passing a seton from the punctum lachrymale superius through the sacculus and duct, and out at the nostril, there to remain till the cure is completed; and, for those purposes, they have invented, and given figures of a number of probes, syringes, and many other instruments, which, they say, have been very successfully used; far be it from me to say that they have not, or to prevent any body from trying those, or any other means, by which mankind may be cured of diseases with the least possible fatigue and pain; but from the experiments which I have made of most of these processes, I must beg leave to suspend my assent to their general utility, or even to their frequent practicability.

"Repeated trials upon dead subjects will undoubtedly enable a man to pass the probe, or perhaps now and then the seton, but he will also find it often absolutely impracticable; and, in the few instances, in which he may chance to succeed, as to this attempt, what will in general be the consequence? not what the writers on these subjects have taught him to believe, a cure, but a sense of pain, and degree of inflammation, which the patient, before such attempts were made, was free from; an exasperation of the disease, and a loss of much time, as I have more than once experienced. To which consideration may be added, that infants and young children are very often afflicted with this disorder, and that such processes as these are absolutely impracticable upon them, &c.

"Anel's syringe I have used successfully, and think it may now and then be very well worth trying, in recent cases more especially, as it may always be used without giving any pain, or running the risk of raising an inflammation; but I must also beg leave to observe, that if the bag is not much dilated, the mucus clear, the skin and cellular membrane uninflamed, and the parts above soft and easy, if the patient will take care not to suffer too great an accumulation, will by the frequent use of a vitriolic collyrium, keep the eye-lids clean and cool, and carefully avoid such things as irritate the membrana narium, or occasion a sudden flux of lymph from the lachrymal gland, the disease may for many years, nay often for life, be kept from being very troublesome, or inconvenient, without any surgery at all." (*Pott.*)

In 1780, Sir William Blizard proposed, instead of injecting water, to introduce quicksilver through a small pipe communicating with a long tube full of this fluid. The specific gravity of the quicksilver, when the sac was distended with it, he believed would have more power, than water propelled through a syringe, to remove the lachrymal obstruction.

Mr. Ware, after trying Sir William Blizard's plan, gave the preference to Anel's syringe, with which he generally injects warm water, through the lower punctum lachrymale, into the lachrymal sac, and puts a finger over the superior punctum to prevent the fluid from escaping through it. With this finger, the lachrymal sac should also be occasionally compressed, in order to assist the determination of the water downward into the nose. Mr Ware has sometimes used the injection thrice a day, though, in general, much less frequently; and, he says, the success he has experienced is considerable. (See *Ware on the Epiphora.*)

"I in general begin the treatment by injecting some warm water through the

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crymale, dont on injecta les voies lacrymales. Morgagni rapporte quelques autres faits qui peuvent servir à l'histoire des injections; mais, il faut avouer que les Ecrivains avoient parlé de cette méthode de sonder, et de celle d'injecter, en des termes si obscurs, et si laconiquement, que les Médecins ni les Chirurgicus n'eussent pu parvenir à l'exécuter, en la suivant literalment. Anel peut donc passer pour le véritable auteur; c'est d'après ses travaux qu'on a connu ceux des autres Ecrivains, et non d'après autrui qu'il est parvenu à sonder et à injecter les points lacrymaux. Cependant Anel trouva beaucoup de critiques et très peu d'approbateurs. Plusieurs Médecins Italiens l'attaquerent, quelques Chirurgiens Français parlerent contre lui d'une manière indécente. L'Académie des Sciences jugea mieux ses travaux. Elle trouva ses observations également nouvelles et ingénieuses." (*Histoire de l'Anatomie et de la Chirurgie, par M. Portal, Tom.* 4, *p.* 398.) With regard to *specillum per oculos trahens*, it appears to me, that the interpretation above laid down is quite unwarranted; and as for the introduction of injections into the lachrymal sac, Anel's predecessors, in all propability, injected the fluid through an ulcerated opening, or a puncture, into this sac, and, not through one of the puncta lachrymalia, as devised and practised by Anel himself. It is the latter method alone, that has peculiarity and merit.

inferior punctum lachrymale, and I repeat the operation four or five days in succession. If, in this space of time, none of the water pass through the duct into the nose, and if the watering of the eye continue as troublesome as it was before the injection was employed, I usually open the angular vein, or direct a leech to be applied near the lachrymal sac; adding here a caution, that the leech be not suffered to fix on either of the eye-lids, lest it produce an extravasation of blood in the adjacent cells. About the same time that blood is taken away in the neighbourhood of the eye, I usually vary the injection, and try the effects either of a weak vitriolic, or anodyne, lotion. In some instances also, when I have found it impossible, after several attempts, to inject any part of the liquid through the duct, I have introduced a golden probe, about the size of a bristle, through the superior punctum lachrymale, and, attending to the direction of the duct, have insinuated its extremity through the obstruction, and conveyed it fully into the nose; immediately after which I have found, that a liquid, injected through the inferior punctum, has passed without any difficulty; and by repeating these operations, for a few successive days, I have at length established the freedom of the passage, and completed the cure. In other instances, I have recommended a strongly stimulative sternutatory to be snuffed up the nose, about an hour before the time of the patient's going to rest, which, by exciting a large discharge from the schneiderian membrane, has sometimes also greatly contributed to open the obstruction in the nasal duct.

"Cases occur very rarely which may not be relieved by some of the means above related." (*Ware's Additional Remarks on the Epiphora.*)

When the discharge has been fetid, Mr. Ware has sometimes found, that a vitriolic lotion, injected into the sac, has quickly corrected the quality of the matter.

Scarpa, in his *Osservazioni sulle principali Malattie degli Occhi*, maintains, that the chief part of the yellow viscid matter, which accumulates in the lachrymal sac, is secreted by the lining of the eye-lids, and by the little glands of Meibomius; and that the altered quality of this secretion has a principal share in the cause of the disease. He states, that the truth of this fact may at once be ascertained by everting the eye-lids; and especially the lower one of the affected side; and by comparing them with those of the opposite eye. The former will always exhibit an unnatural redness of the internal membrane, which has a villous appearance, all along the extent of the tarsus, while their edges are swollen; and numerous varicose vessels are distinguishable on its surface. The follicles of Meibomius, are also turgid and prominent.

Hence, Scarpa advises making such applications to the inside of the eye-lids, as have a tendency to improve the quality of the secretion from them, at the same time, that attempts are made to remove the obstruction in the ductus nasalis. Mr. Ware, indeed, had previously noticed, that such treatment may occasionally be proper.

"When an epiphora is occasioned by an acrimonious discharge from the sebaceous glands on the edges of the eye-lids, it must be evident, that injections into the sac will be very insufficient to accomplish a cure, because the sac is not the seat of the disorder. The remedies that are employed must be directed, on the contrary, to the ciliary glands themselves, in order to correct the morbid secretion that is made by them; and for this purpose, I do not know any application that is so likely to prove so effectual as the unguentum hydrargyri nitrati, of the new London Dispensatory, which should be used here in the same manner, in which it is applied in common cases of the psorophthalmy. It will be proper to cleanse the eye-lids every morning, from the gum that collects on their edges during the night, with some soft unctuous applications; and I usually advise to apply to them, two or three times, in the course of the day, a lotion composed of three grains of white vitriol, in two ounces of rose, or elder-flower, water."

Mr. Ware very judiciously censures the plan of applying collyria to the eye by means of linen, wet in them; and he recommends eye-glasses for the purpose, or insinuating the fluid, between the eye and eye-lids, with a camel-hair pencil, thoroughly wet in the application. (*Additional Remarks on the Epiphora.*)

Scarpa also extols washing the eye, three or four times a day, with a vitriolic collyrium; and, besides praising the ointment recommended by Mr. Ware, he recommends Janin's ophthalmic ointment, to be smeared over the margins and lining of the eye-lids, every morning and evening.

℞. *Adipis. Suillæ. Tutiæ præp. Bol. Armen. sing.* ʒij. *Calcis Hydrarg. alb.* ʒj. *Misce.* To be used at first lowered with a larger proportion of lard, than is here ordered.

TREATMENT OF THE SECOND AND THIRD STAGES OF THE FISTULA LACHRYMALIS.

When the disease, says Mr. Pott, is not beyond the simple state just described, that is, when the parts round about are much, or constantly inflamed, or the skin, covering the tumour, is burst, there is

something more to be done, if a cure is intended. In this state, an opening in the upper part of the sacculus lachrymalis becomes in general absolutely necessary; and, as a wound, made by a knife, leaves a much less disagrèeable scar, than that which necessarily follows the bursting of the skin, one being a mere simple division, the other a loss of substance, it will always be found best to anticipate the accident of bursting, by making an opening, as soon as the integuments are in such a state as to threaten it.

If the sacculus is already burst, the opening, if necessary, is to be enlarged with a knife, or dilated. The incision made, the sacculus should be moderately distended with dry lint, or prepared sponge; by which means an opportunity will be gained, in two or three days, of knowing the state of the inside of the sac, and of the ductus nasalis; if the former is neither sloughy, nor otherwise diseased, and the obstruction in the latter but slight, sometimes after a free discharge has been made, for some days, and the inflammation, occasioned by the first operation, is gone off, the sac contracts itself, a superficial dressing, with moderate pressure, heals the sore, the lachrymal fluid resumes its wonted course, and the disease disappears. (*Pott.*)

When this simple method fails, the point to be aimed at, says Mr. Pott, is to render the nasal duct pervious; and, for this purpose, the passage from the sac to the nose, must be gradually distended, by passing either a probe, or a piece of cat-gut, or a bougie, gently into it, as far as it will go, and repeating it occasionally, until it is got quite through. (*Pott.*)

Such was the practice commonly pursued, till M. Pellier, and Mr. Wathen, recommended introducing a metallic tube down the ductus nasalis, and leaving it for a time in that situation, with a view of preventing the duct, after it had been made pervious, from closing again. It seems unnecessary to enter into a detail of their methods, which have now universally given place to a most simple mode of practice, devised by Mr. Ware, and explained by him in the following terms.

"Whenever a patient applies to me for relief, on account of an obstruction in the lachrymal passage, I always think it right to attempt to clear the canal from any inspissated mucus that may be lodged in it, by injecting some warm water through the inferior punctum lachrymale; joining with it, when necessary, a trial of the other remedies that have been proposed in the two papers on the epiphora, which were laid before the public in the years 1792 and 1795. But if, after the use of these for about a week or ten days, there be not some perceptible advance towards a cure, or, if, from the long continuance of the obstruction, there be reason to fear that it is too firmly fixed to yield to this easy mode of treatment, I do not hesitate to propose the operation which is now to be described. The only persons, with respect to whom I entertain any doubts as to the propriety of this opinion, are infants. In such subjects, I always think it advisable to postpone the operation, unless the symptoms be particularly urgent, until they are eight or nine years old.

"If the disease has not occasioned an aperture in the lachrymal sac, or if this aperture be not situated in a right line with the longitudinal direction of the nasal duct, a puncture should be made into the sac, at a small distance from the internal juncture of the palpebræ, and nearly in a line drawn horizontally from this juncture towards the nose, with a very narrow spear-pointed lancet. The blunt end of a silver probe, of a size rather smaller, than the probes, that are commonly used by surgeons, should then be introduced through the wound, and gently, but steadily, be pushed on in the direction of the nasal duct, with a force sufficient to overcome the obstruction in this canal, and until there is reason to believe that it has freely entered into the cavity of the nose. The position of the probe, when thus introduced, will be nearly perpendicular; its side will touch the upper edge of the orbit; and the space between its bulbous end in the nose and the wound in the skin will usually be found, in a full-grown person, to be about an inch and a quarter, or an inch and three-eighths. The probe is then to be withdrawn, and a silver style of a size nearly similar to that of the probe, but rather smaller, about an inch and three-eighths in length, with a flat head like that of a nail, but placed obliquely, that it may sit close on the skin, is to be introduced through the duct, in place of the probe, and to be left constantly in it. For the first day or two after the style has been introduced, it is sometimes advisable to wash the eye with a weak saturnine lotion, in order to obviate any tendency to inflammation which may have been excited by the operation; but this in general is so slight, that I have rarely had occasion to use any application to remove it. The style should be withdrawn once every day for about a week, and afterwards every second or third day. Some warm water should each time be injected through the duct into the nose, and the instrument be afterwards replaced in the same manner as before. I formerly used to cover the head of the style with a piece of dyachylon plaister spread on black silk; but have of late obviated the necessity for

applying any plaister by blackening the head of the style with sealing-wax."

Mr. Ware did not on first trying this method, expect any relief, till the style was left off. However, he was agreeably disappointed, to find, that the watering of the eye ceased, as soon as the style was introduced, and the sight became proportionably more useful and strong.

The wound, which Mr. Ware makes in the sac, when there is no suitable ulcerated aperture, is only just large enough to admit the end of the probe, or style; and this soon becomes a fistulous orifice, through which the style may be passed without the least pain. In short, in about a week or ten days, the treatment becomes so easy, that the patient, or any friend, is fully competent to do what is necessary. It merely consists in withdrawing the style, two, or three times a week, occasionally injecting some warm water, and then replacing the instrument as before.

Some, finding no inconvenience from the style, and being afraid to leave it off, wear it for years; many others disuse it in about a month, or six weeks, and continue quite well. The ulcerations, sometimes existing over the lachrymal sac, commonly heal, as soon as the tears can pass down into the nose; but Mr. Ware mentions two instances, in which such sores did not heal, until a weak solution of the hydrargyrus muriatus, and bark, were administered. (See *Ware on the Fistula Lachrymalis.*)

TREATMENT OF THE FOURTH STAGE OF THE FISTULA LACHRYMALIS.

The last stage is that, in which the natural passage, from the sacculus to the nose, is so diseased as to be quite obliterated; or in which the bones are sometimes found to be carious.

The methods, hitherto described, have all been calculated to preserve the natural passage; they are sometimes successful; but, when they are not, there is no chirurgical means left, but to attempt the formation of an artificial one in its stead. The upper and hinder part of the sacculus lachrymalis is firmly attached to the os unguis, a small, and very thin bone, just within the orbit of the eye; which bone is so situated, that if it be by any means broken through, or removed, the two cavities of the nose and of the orbit, communicate with each other; consequently, the os unguis forms the partition between the hinder part of the lachrymal bag, and the upper part of the cavity of the nose; and it is by making a breach in this partition, that we attempt the formation of an artificial passage for the lachrymal fluid. (*Pott.*)

The cautery has now been long disused for making an aperture in the os unguis; and there are different instruments recommended for the purpose, such as a large, strong probe, a kind of gimblet, a curved trocar, &c.; each of which, says the above elegant writer, if dextrously, and properly applied, will do the business very well; the one necessary caution is, so to apply whatever instrument is used, that it may pierce through that part of the bone which lies immediately behind the sacculus lachrymalis, and not to push too far up into the nose, for fear of injuring the os spongiosum behind, while it breaks its way. Mr. Pott adds, that he himself has always used a curved trocar, the point of which should be turned obliquely downward, from the angle of the eye, towards the inside of the nose. The accomplishment of the breach will be known by the discharge of blood from the nostril, and of air from the wound, upon blowing the nose. Care must be taken to apply the instrument to the part of the bone, anterior to the perpendicular ridge, which divides it.

As soon as the perforation is made, a tent of lint should be introduced, of such size as to fill the aperture, and so long as to pass through it into the cavity of the nose: this should be permitted to remain in two, three, or four days, till the suppuration of the parts renders its extraction easy; and, after that, a fresh one should be passed every day, until the clean granulating appearance of the sore makes it probable, that the edges of the divided membrane are in the same state. The business now is to prevent the incarnation from closing the orifice; for which purpose, the end of the tent may be moistened with spir. vitriol. ten. or a piece of lunar caustic, so included in a quill, as to leave little more than the extremity naked, may at each dressing, or every other, or every third day, be introduced; by which the granulations will be repressed, and the opening maintained: and when this has been done for some little time, a piece of bougie of proper size, or a leaden cannula, may be introduced instead of the tent; and leaving off all other dressing, the sore may be suffered to contract as much as the bougie will permit; which should be of such length, that one extremity of it may lie level with the skin in the corner of the eye, and the other be within the nose.

The longer time the patient can be prevailed upon to wear the bougie, the more likely will be the continuance of the opening; and, when it is withdrawn, the external orifice should be covered only by a superficial pledget, or plaster, and suffered to heal under moderate pressure. (*Pott.*)

After the perforating instrument is withdrawn, Mr. Ware recommends a nail-headed style, about an inch long, to be

introduced through the aperture, in the same way in which it is introduced through the nasal duct, in cases, in which the obstruction is not so great as to prevent its passing in this direction; and it may remain here with as much safety, as in this last-mentioned instance, for as long a time as its continuance may be thought necessary to establish the freedom of the communication.

Mr. Ware is undoubtedly deserving of much honour for the improvement of this part of surgery; the following short passage of his own work fully shews in what his merits consist. "It may, perhaps, be thought, that the operation, which I have taken the liberty to recommend, has a close resemblance to that which was proposed by the late Mr. Pott. It will be found to differ from it, however, in many essential respects. Mr. Pott, for instance, as well as Mr. Warner and Mr. Bell, advises the operator to make a large opening into the lachrymal sac. On the contrary, I have proposed to make a small one. These gentlemen, again, afterwards recommend different kinds of dressings; some of which are difficult to be applied, and painful in their action. The dressing, which I have proposed, is confined simply and solely to a silver nail-headed style. Their operation is performed, and their dressings employed, in order to form a communication, through which the tears may afterward pass into the nose; and until their passage is formed, and the necessity for further dressings ceases, they do not encourage any hope, that the disorder will be removed. Experience, however, teaches me, that as soon as the style is introduced, the disorder immediately ceases; and the tears pass at once into the nose, either through the natural nasal duct, or through the perforation that is made by the operation in the thin part of the os unguis." (*Ware on the Fistula Lachrymalis.*)

The works, containing the most valuable information, relative to the present subject, are the *Mémoires de l'Academie de Chirurgie, Tom. 5, Edit.* 12mo. *in which are several essays on the fistula lachrymalis: viz. one by M. Bordenave, entitled, "Examen des Réflexions critiques de M. Molinelli, insérées dans les Mémoires de l'Institut de Bologne, contre le Mémoire de M. Petit, sur la Fistule Lachrymale, inséré parmi ceux de l'Acad. Royale des Sciences de Paris. Année* 1734. *Another essay by M. de la Forest, styled "Nouvelle Méthode de traiter les Maladies du Sac Lachrymal, nommées communément Fistules Lachrymales." A third by M. Louis, called "Réflexions sur l'Opération de la Fistule Lachrymale." Anel has described his plan of treatment in various works: "Observation singuliére sur la fistule lacrymale, dans laquelle l'on apprendra la méthode de la guérir radicalement." Turin,* 1713, *in* 4o. "*Nouvelle Méthode de guérir les fistules lacrymales.*" *Turin,* 1713, *in* 4o. "*Suite de la Nouvelle Méthode,*" *&c. ibid.* 1714, *in* 4o. "*Dissertation sur la nouvelle découverte de l'hydropisie du conduit lacrimal,*" *Paris,* 1716, *in* 12mo. *And, lastly, Anel has published in the Mém. de l'Acad. des Sciences, année* 1713, "*Précis de sa Nouvelle manière de guérir les fistules lacrymales.*" *Sabatier's Médecine Opératoire, Tom.* 2, *p.* 371—406. *Edit.* 1. *Richter's Anfangsgrunde der Wundarzneykunst, Band.* 2, *Kap.* 11. *Pott's observations relative to the disorder of the corner of the eye, commonly called the Fistula Lachrymalis; Ware on the Epiphora and Fistula Lachrymalis; Scarpa sulle principali Malattie degli Occhi. Capo* 1. *Wathen's Tube for the Fistula Lachrymalis, Lond.* 1781.

FISTULÆ IN PERINÆO. When the methods recommended for the removal of strictures (See *Urethra, Strictures of*) have not been attempted, or not succeeded, nature endeavours to relieve herself by making a new passage for the urine, which, although it often prevents immediate death, yet, if not remedied, is productive of much inconvenience and misery to the patient through life. The mode by which nature endeavours to procure relief, is by ulceration on the inside of that part of the urethra which is enlarged, and within the stricture. The ulceration commonly begins near, or close to the stricture, although the stricture may be at a considerable distance from the bladder. The stricture is often included in the ulceration, by which means it is removed; but, unluckily, this does not always happen. The ulceration is always on the side of the urethra, next to the external surface.

The internal membrane and substance of the urethra having ulcerated, the urine readily gets into the loose cellular membrane of the scrotum and penis, and diffuses itself all over those parts; and as this fluid is very irritating to them, they inflame and swell. The presence of the urine prevents the adhesive inflammation from taking place; it becomes the cause of suppuration wherever it is diffused, and the irritation is often so great that it produces mortification, first in all the cellular membrane, and afterwards in several parts of the skin; all of which, if the patient live, slough away, making a free communication between the urethra and external surface, and producing *fistulæ in perinæo.*

However, when the ulceration takes place further back than the portion of the urethra, between the glans penis and membranous part of this canal, the abscess is generally more circumscribed.

The urine sometimes insinuates itself into the corpus spongiosum urethræ, and

is immediately diffused through the whole, even to the glans penis, so as to produce a mortification of all those parts.

Although the ulceration of the urethra may be in the perinæum, yet the urine generally passes easily forwards into the scrotum, which contains the loosest cellular substance in the body; and there is always a hardness, extending along the perinæum to the swelled scrotum, in the track of the pus.

Ulceration can only be prevented by destroying the stricture; but, when the urine is diffused in the cellular membrane, the removal of the stricture will generally be too late to prevent all the mischief, although it will be necessary for the complete cure. Therefore, an attempt should be made to pass a bougie, for perhaps the stricture may have been destroyed by the ulceration, so as to allow this instrument to be introduced. When this is the case, bougies must be almost constantly used, to procure as free a passage forwards, in the right way, as possible. When the bougie cannot pass, the application of caustic would in many cases be too slow in its operation, and, in others, cannot be tried, by reason of the situation of the stricture.

While we are attempting to cure the stricture, antiphlogistic measures, particularly bleeding, are to be adopted. The parts should be exposed to the steam of hot water; the warm bath made use of; opium and turpentine medicines given by the mouth, and in glysters; with a view of diminishing any spasmodic affection. But, all these proceedings are often insufficient, and, therefore, an immediate effort must be made, both to unload the bladder, and prevent the further effusion of urine, by making an opening into the urethra, somewhere beyond the stricture, but, the nearer to it, the better.

Introduce a director, or some such instrument into the urethra, as far as the stricture, and make the end of it as prominent as possible, so as to be felt; which, indeed, is often impossible. If it can be felt, it must be cut upon, and the incision carried on a little farther, towards the bladder, or anus, so as to open the urethra beyond the stricture. This will both allow the urine to escape, and destroy the stricture. If the instrument cannot be felt, at first, by the finger, we must cut down towards it; and, on afterwards feeling it, proceed as above.

When the stricture is opposite the scrotum, as the opening cannot be made in this situation, it must be made in the perinæum, in which case, there can be no direction given by an instrument, as one cannot pass sufficiently far, and the only guide is our anatomical knowledge. The opening being made, proceed as directed in the cure of a false passage. (See *Urethra, False Passage of.*) In whichsoever way the operation is done, a bougie, or a catheter, which is better, must afterwards be introduced, and the wound healed over it.

When the inflammation, from the extravasation of urine, is attended with suppuration and mortification, the parts must be freely scarified, in order to give vent both to the urine and pus. When there is sloughing, the incisions should be made in the mortified parts.

Sometimes, when the urethra is ulcerated, and the cellular membrane of the penis and prepuce is so much distended, as to produce a phymosis, it is impossible to find the orifice of the urethra.

Frequently the new passages for the urine do not heal, on account of the stricture not being removed: and even when this has been cured, they often will not heal, but become truly fistulous, and produce fresh inflammations and suppurations, which often burst by distinct openings. Such new abscesses and openings often form, in consequence of the former ones having become too small, before the obstruction in the urethra is removed.

Such diseases sometimes bring on intermittent disorders, which do not yield to bark; but do not recur, when the fistulæ, and disease of the urethra, have been cured.

In order to cure fistulæ in perinæo, unattended with the above described urgent symptoms, the urethra must be rendered as free as possible, and, this alone is often enough; for, the urine finding a ready passage forwards, is not forced into the internal mouth of the fistulæ, so that these heal up. The cure of the strictures, however, is not always sufficient, and the following operation becomes indispensable.

The sinuses are to be laid open in the same manner as other sinuses, which have no disposition to heal. In doing this, as little as possible of the sound part of the urethra must be opened. Hence, the surgeon must direct himself to the inner orifice of the fistulæ, by means of a staff, introduced (if possible) into the bladder, and a probe passed into one of the fistulous passages. The probe should be first bent, that it may more readily follow the turns of the fistula. When it can be made to meet the staff, so much the better; for, then the operator can just cut only what is necessary.

When the fistula is so straight, as to admit of a director being introduced, this instrument is the best. When neither the probe, nor the director, can be made to pass as far as the staff, we must open the sinuses as far as the first instrument goes, and then search for the continuation of

the passage, for the purpose of laying it open.

Having divided the fistulæ, as far as their termination, in the urethra, a catheter should be introduced, and worn at first, almost constantly. This is better than a bougie, which must be frequently withdrawn to allow the patient to make water, and it often could not be introduced again without getting entangled in the wounds.

Whatever instrument is used for keeping the passage clear and open, while the sores are healing, whether the sores are the consequence of the causes of the fistula, or the above operation, there is, in many cases, a limited time for its employment. At first, it often assists the cure; but, in the end, it may obstruct the healing, by acting at the bottom of the wound, as an extraneous body. Hence when the sores become stationary, let the catheter be withdrawn, and introduced only occasionally.

Even after the sores are well, the bougie may afterwards be used, in order to determine whether the passage is free from disease.

When fistulæ in perinæo have been laid open, the wounds are to be at first dressed down to the bottom as much as possible, which will prevent the reunion of the parts first dressed, and make the granulations shoot from the bottom, so as to consolidate the whole by one bond of union. (See *Treatise on the Venereal Disease, by John Hunter.*) Additional observations upon this subject, and, in particular, the opinions of Desault concerning it, will be found in the article, *Urinary Abscesses and Fistulæ.*

FISTULA SALIVARY. (See *Parotid Duct.*)

FLUCTUATION. (from *fluctuo*, to float.) The perceptible motion communicated to any collection of purulent matter, or other kind of fluid, by applying some of the fingers of each hand, at a certain distance from each other, to the surface of the tumour, and pressing with them alternately, in such a manner, that the fingers of one hand are to be employed inpressing, while those of the other hand remain lightly placed on another part of the swelling. When the ends of one set of fingers are thus delicately applied, and the surgeon taps, or makes repeated pressure with the fingers of the other hand, the impulse, given to the fluid, is immediately perceptible to him, and the sensation, thus received, is one of the principal symptoms, by which practitioners are enabled to discover the presence of fluid in a great variety of cases. Great skill in ascertaining by the touch the presence of fluid in parts, or being endued with the *tactus eruditus*, as it is termed, distinguishes the man of experience as remarkably, perhaps, as any quality that can be specified.

When the collection of fluid is very deeply situated, the fluctuation is frequently exceedingly obscure, and sometimes not at all distinguishable. In this circumstance, the presence of the fluid is to be ascertained by the consideration of other symptoms. For example, in cases of hydrops pectoris and empyema, surgeons do not expect to feel the undulation of the fluid in the thorax with their fingers; they consider the patient's difficulty of breathing, the uneasiness attending his lying upon one particular side, the œdema of the parietes of the chest, the dropsical affection of other parts, the more raised and arched position of the ribs on the affected side, the preceding rigors, fever, and several other circumstances, from which a judgment is formed, both with regard to the presence and the peculiar nature of the fluid.

FOMENTATION. (*Fomentatio, Fomentum, Fotus.*) By a fomentation, surgeons commonly mean the application of flannel or some other substance, wet with warm water, or some medicinal decoction, to any part of the body. Fomentations are chiefly of use in surgery in relieving pain, and inflammation, and in promoting suppuration, when this is desirable. Some particular decoctions, however, are used for fomentations, with a view of affecting by means of their medicinal qualities, scrofulous, cancerous, and other sores, of a specific nature. We shall just mention a few of the most useful fomentations in common use.

FOMENTUM AMMONIÆ MURIATÆ. ℞. *Fomenti Communis* ℔ij. *Ammon. Mur.* ʒj. *Spirit. Camph.* ʒij.

Just before using the hot decoction, add to it the ammonia muriata, and spirit. Said to be of service to some indolent ulcers; and, perhaps, it might be of use in promoting the absorption of some tumours, and suppuration in others.

FOMENTUM CICUTÆ. ℞. *Fol. Cicut. recent.* ℔j. *vel Fol. Cicut. exsiccat.* ʒiij. *Aq. Comm.* ℔iij. *Coque usque reman.* ℔ij. *et cola.*

This fomentation is considered, as a very proper one for many scrofulous, cancerous, and phagedenic ulcers.

FOMENTUM CHAMÆMELI. ℞. *Lini contusi* ʒj. *Chamæmeli* ʒij. *Aq. Distillat.* ℔vj. *Paulisper coque, et cola.*

This is a common fomentation, for ordinary purposes.

FOMENTUM GALLÆ. ℞. *Gallæ Contusæ* ʒss. *Aq. Ferventis* ℔ij. *Macera per horam, et cola.* Used for the prolapsus ani. It is sometimes also employed,

as a cold application, in cases of hemorrhoids.

FOMENTUM PAPAVERIS ALBI. ℞. *Papav. Alb. Exsiccati* ℥iv. *Aq. Pur.* ℔vj. Bruise the poppies, put them in the water, and boil the liquor, till only a quart remains, which is to be strained. This fomentation is a very excellent one, for very painful inflammations of the eyes, and for numerous ulcers, and other diseases, attended with intolerable pain.

FONTANELLA. (dim. of *fons*, a fountain.) An issue, so named from its continually running. (See *Issue.*)

FONTICULUS. (dim. of *fons*, a fountain.) An issue, so named from its continually running. (See *Issue.*)

FORCEPS, is an instrument much employed in surgery for a variety of purposes, and having accordingly various constructions. The general design, however, of every surgical forceps is to take hold of substances, which cannot be conveniently grasped with the fingers; and, of course, the instrument is always formed on the principle of a pair of pincers, having two blades, either with, or without handles, according to circumstances. The smallest forceps is that which is employed in the operation of extracting the cataract, and which is useful for removing any particles of opaque matter from the pupil, after the chief part of the crystalline lens has been taken away.

Another forceps, of larger size, is that used for taking up the mouths of the arteries, when these vessels require the ligature, in cases of hemorrhage. This instrument is also frequently employed for taking dressings off sores, removing pieces of dead bone, foreign bodies from wounds, and, particularly, for raising the fibres, which are about to be cut, in all operations, where careful dissection is required. This forceps resembles that, which is contained in every case of dissecting instruments, and is often called the *artery*, or *dissecting* forceps, from its more important uses.

Neither of the foregoing forceps is made with handles; each opens by its own elasticity; and the ends of the blades only come into contact, when pressed together by the surgeon.

The following kinds of forceps are constructed with handles, by means of which they are both opened and shut:

1. The common forceps, contained in every pocket case of surgical instruments, and used for removing dressings from sores, extracting dead pieces of bone, foreign bodies, &c.

2. Larger forceps, employed for extracting polypi.

3. Forceps of different sizes and constructions, used in the operation of lithotomy, for taking the stone out of the bladder, or for breaking the calculus, when it is too large to be extracted in an entire state.

FRACTURE. (from *frango*, to break.) Is a solution of continuity of one, or of several bones, produced in general by external force, but, occasionally, by the powerful action of muscles, as is often exemplified in the broken patella. The long bones are particularly subject to be broken, and, mostly, at their middle part. They may, however, be fractured near their extremities. Sometimes, the same bone is broken in different places, which case is termed a *comminuted* fracture.

Though, when the middle part of a bone is fractured, the ends of the fracture are more apt to be displaced, on account of the contiguous surfaces being less extensive, yet, this kind of fracture is the least dangerous, because the violence, which has caused the accident, has seldom been applied to the broken part, and consequently, the adjacent soft parts are uninjured. The middle of a bone also is broken by less force, than any other part of it, and the fracture being distant from any joint, no stiffness, nor anchylosis, is likely to result from the injury.

Fractures are also distinguished into *transverse* and *oblique*. Duverney has admitted another class, viz. *longitudinal* ones; but, J. L. Petit has denied the possibility of this case, and Boyer adopts the opinion of the latter, rejecting, as impossible, the longitudinal fracture, unless that name be given to longitudinal splinters of comminuted fractures. M. Louis positively rejected the possibility of longitudinal fractures, since, he thought, that they could not happen, without the bone being at the same time fractured obliquely and transversely. The following case is related by M. Levêillé, in order to shew, that longitudinal fractures are possible. Circumstances made it necessary for him to amputate the thigh of an Austrian soldier, who was put under his care in the year 1800, in consequence of being struck with a ball in the lower third of the leg at the battle of Marengo. The soldier had walked several miles, after receiving the injury, before he arrived at Pavia. The wound appeared simple, and likely to heal, as soon as the injured portion of the tibia had exfoliated. The event turned out otherwise, and the thigh was amputated.

M. Levéillé has preserved the tibia, upon which the impression of the ball may be distinguished, and, from this point, run several longitudinal and oblique lines, which extend from the lower third towards the upper head of the tibia. These are fissures, which interest the

whole thickness of the parietes of the medullary canal. They have been acknowledged to be so by the professors, Dubois, Chaufrier, Duméril, Deschamps, and Roux, who were appointed by the Ecole De Médecine to enquire into the fact. (*Levéillé, Nouvelle Doctrine Chirurgicale, Tom.* 2, *p.* 158.)

The most important division of fractures, is into *simple* and *compound*. By a *simple* fracture, surgeons mean a breach in the continuity of one, or more bones, without any external wound, communicating internally with the fracture, and caused by the protrusion of the ends of the broken bone, or bones. By a *compound* fracture, they signify the same sort of injury of a bone, or bones, attended with a laceration of the integuments, which laceration is produced by the protrusion of one, or both ends, of the fracture.

The dangerous nature of compound fractures will be fully understood, when we presently treat separately of this subject.

The causes of fractures are divided into *predisposing* and *remote*.

In the first class are comprehended, the situation and functions of the bones, the age of the patients, and their diseases. Superficial bones are more easily fractured, than those, which are covered by a considerable quantity of soft parts. The functions of some bones render them more liable to be fractured, than others; thus the radius, which supports the hand, is more liable to be fractured, than the ulna. The clavicle, which serves to keep the shoulder in its proper position, and support on its arched extremity all the motions of the upper extremity, is hence very subject to be broken. The gradual increase of the quantity of the phosphate of lime, in the structure of the bones, makes them brittle, in proportion as we advance in years, and, in old age, the proportion of the inorganized to the organized part is so great, that the bones are fractured by the slightest causes. In childhood, the fibrous and organized part bears a greater proportion to the earth, and the bones being, consequently, more elastic and flexible, are not so easily broken, as in old age.

Lues venerea, arthritis, cancer, rachitis, scurvy, and scrofula, says M. Levéillé, predispose to fractures. B. Bell mentions two venereal patients, of whom the hardest and largest bones were completely broken by the ordinary action of the muscles of the limb. Fabricius Hildanus quotes from Sarrazin, a physician of Lyons, the case of a gouty patient, sixty years of age, who, in putting on his glove, broke his arm; the fracture having been ascertained, three days afterwards, to be situated above the elbow. Desault used often to speak of a nun of Salpêtrière, whose arm was broken, as a person was handing her out of a carriage. M. Louis, who was vexed, that no union took place, was not a little surprised to find her thigh bone experience the same fate, one day as she was changing her posture in bed. It was then that M. Louis learned, that this lady had a cancer in her right breast. M. Levéillé assures us, that he has observed similar cases in the Hôtel Dieu.

According to this last writer, the history of two girls is related by Buchner, one of whom died ricketty at the age of sixteen, having broken the femur a short time before her death; and the other, after taking the breast very well for two years, and thriving for a time, became affected with rachitis, and met with the same accident as she was merely running along in the street. (*Nouvelle Doctrine Chirurgicale, Tom.* 2, *p.* 163.)

Many extraordinary instances of fractures from a morbid softness and fragility of the bones are upon record. Suffice it here, to refer to the Philosophical Transactions; Mém. de l'Acad. Royale des Sciences; Act. Hafniens; German Ephem.; Gooch's Chirurgical Works, Vol. 2; Saviard's Observations Chirurgicales, p. 274, &c. (See also *Fragilitas* and *Mollities Ossium.*)

On the subject of fractures, produced by the scurvy, Levéillé recommends us to peruse Marcellus Donatus; Saviard's Observations; Heyne de Morbis Ossium; Poupart's Works inserted in the Mém. de l'Acad. de Sciences, 1699; and the Treatise published at Verona, in 1761, by Jean de Bona.

Paré, Platner, Callisen, and several other writers, have set down cold, as a predisposing cause of fractures. This doctrine has originated from these injuries being more frequent in the winter time, and is quite erroneous, since, in cold countries, the greater number of falls, which happen in the winter, is a circumstance, that fully explains why fractures are then more common, than in summer.

The remote cause of fractures is external force, variously applied, in falls, blows, &c. In particular instances, the bones are broken by the violent action of the muscles attached to them; this is almost always the case with the fractured patella. The olecranon and os calcis have likewise been broken by a violent contraction of the muscles inserted into them. With respect to the heel, Petit records two instances, one of which was communicated to him by Poncelet, and the other seen by himself in Madame La Presidente de Boissire, who met with the accident in walking a gentle pace in the court of the Hôtel de Soubise. When in-

jury happens in leaping, or falls from a high situation, M. Levéillé thinks it more probable, that a portion of the os calcis is torn off by the powerful action of the muscles of the calf, than that it is broken by any blow immediately on the part. He states, that Desault used frequently to cite two examples of this kind, one of which is recorded in his Œuvres Chirurgicales.

Whether the long bones can be fractured by the mere action of the muscles, has been an unsettled point. In the Philosophical Transaction, a fracture of the humerus is ascribed to this cause, and M. Botentuit has seen the same accident happen in striking a shuttle-cock with a battledore. According to M. Debeaumarchef, as a man was descending a ladder at a quick rate, his heel got entangled in an opening, and he made a violent exertion to avoid falling. The consequence was a fracture of the lower third of the leg. Curet informs us, that a cabin-boy, aged seventeen, made a considerable effort to keep himself from being thrown down by the rolling of the ship, as he was making water. The femur was fractured by the powerful action of the muscles of the thigh. The lad had no fall, and, with some difficulty, supported himself on the other limb, till he received assistance.

We are told, says M. Levéillé, by Poupée Desportes, that a negro, about twelve or thirteen years old, was seized with such violent spasmodic contractions of the muscles of the lower extremities, that the feet were turned backward, and the neck of each thigh bone was fractured, the ends of the broken bones also protruding through the skin upon the outside of the thigh. A cure was effected, after an exfoliation. We read, also, in the Melanges des Curieux de la Nature, that, during a fit of epilepsy, a child, ten years old, had its left humerus and tibia broken, and, that upon opening the body, other solutions of continuity were observed. Doctor Chamseru recollects having assisted, at his father's house, in dressing a child, eleven or twelve years old, that had broken the humerus in throwing a stone, a considerable distance. (*Levéillé Nouvelle Doctrine Chirurgicale, Tom.* 2, *p.* 164—166.)

For my own part, making all due allowance for the inaccuracy of some of the reports made by writers, I think the possibility of the long bones being broken by the violent action of the muscles is sufficiently proved. I have never seen but one example of the occurrence; but, it was a very unequivocal one. I once attended at Pentonville, for Mr. Ramsden, an exceedingly strong man, who broke his os brachii in making a powerful blow, although he missed his aim and struck nothing at all. The whole limb was afterwards affected with vast swelling and inflammation. This man, I remember, was occasionally seen by Mr. Welbank, of Chancery-lane.

Some of the symptoms of fractures are very equivocal. The pain, and inability to move the limb, commonly enumerated, may arise from a mere bruise, a dislocation, or other cause. The crepitus, the change in the form of the limb, and the shortening of it, are circumstances, communicating the most certain information; and the crepitus, in particular, is the principal symptom to be depended upon. The signs of fractures, however, are so exceedingly various, according to the bones, which are the subject of injury, that, it cannot be said, that there is any one, which is invariably attendant on such cases, and characteristically confined to them. The writers of systems of surgery have usually noticed loss of motion in the injured limb, deformity, swelling, tension, pain, &c. as forming the general diagnosis of fractures. However, it is easily comprehensible by any one, acquainted with anatomy, that numerous fractures cannot prevent the motion of the part, nor occasion outward deformity; and every surgeon must know, that, though, at first, there may be pain in the situation of a fracture, no swelling and tension take place, till after a certain period.

When, therefore, a limb is broken, and the event is not manifest from the distortion of the part, it is proper to trace, with the fingers, the outlines of the suspected bone: if it be the tibia, let the surgeon examine with his fingers, whether there is any inequality along the anterior surface, and along the sharp front edge of that bone. If it be the clavicle, let him trace the superficial course of the bone, in the same attentive manner. Wherever any unusual pain occurs, or any unnatural irregularity appears, then let him try, if a grating, or crepitus, cannot be felt on endeavouring to make one end of the fracture rub against the other. When the os brachii, or the os femoris, is the subject of enquiry, a crepitus is felt almost as soon as the limb is touched, and, in the case of the broken thigh, there is a considerable shortening of the extremity, unless sometimes when the fracture is of the transverse kind. But, when there are two bones, as in the leg and the forearm, and only one is broken, the other continues to prevent the limb from being shortened, and thrown out of its natural shape, so that a crepitus can only be felt by a very careful examination with the fingers.

I am aware, that considerable harm, and great unnecessary pain, have been occasioned in the practice of surgery, by an over-officious care to feel the grating

of fractured bones, and, whenever the case is sufficiently evident to the eyes, I cannot refrain from censuring those practitioners, who indulge their own ill-judged habits, at the expence of torture to the unfortunate patient. A fracture is an injury, that is necessarily attended with a great deal of pain, and followed by more, or less swelling, and inflammation; and to increase these evils by roughly, or unnecessarily handling the part, is both ignorantly cruel, and, if I may use the expression, unsurgical.

In some kinds of fractures, the broken bone is so surrounded with thick fleshy parts, that it is very difficult to feel a crepitus, or ascertain the existence of the injury. Some fractures of the neck of the thigh bone, unattended with much retraction of the limb, are instances illustrative of this observation.

The prognosis of fractures varies, according to the bone injured, what part of it is broken, the direction of the breach of continuity, and what other mischief complicates the case. Fractures of bones, which have many strong muscles inserted into them, are more difficult of cure, than those of other bones, which have not so many powers attached to them, and capable of disturbing the ends of their fractures.

The fracture of the middle part of a long bone, is less dangerous, than a similar injury near a joint, with which the bone is articulated, for reasons mentioned above.

Oblique fractures are more troublesome, and difficult of cure, than transverse ones, because an oblique surface does not resist the retraction of the lower portion of the broken bone, and consequently, it is very difficult to keep the ends of the fracture applied to each other, in a proper manner.

Fractures complicated with a violent contusion of the soft parts, or with a wound, rendering them compound ones, are much more dangerous, than other ones free from such accidents. Fractures of the leg are generally more serious, than similar injuries of the upper extremity.

A fracture may be rendered a very dangerous case, by being attended with a wound of a large artery.

In a debilitated old man, a fracture is less likely to end well, than in a healthy child, or strong young subject. The scurvy is said to retard the formation of callus; but, it is not true, that pregnancy prevents the union of fractures. Some years ago, I attended for Mr. Ramsden, a woman, in a court leading out of St. Paul's Church-yard, who broke both bones of her leg, when she was several months gone with child. Her pregnancy, however, did not appear to be at all unfavourable to the cure, as she got quite well in the usual time. "It is not generally settled," says a modern writer, "whether pregnancy should be accounted a complication. I have seen, with some practitioners, a pregnant woman get well of a simple fracture in the ordinary time." (*Levéillé, Nouvelle Doctrine Chirurgicale, Tom.* 2, *p.* 159.) And, in another place, he says, "*Contre l'opinion de Fabrice de Hilden, l'expérience m'a prouvé que, chez les femmes grosses, le cal était aussi prompt à se former, que chez toute autre personne.*" (*Op. cit. Tom.* 2, *p.* 172.) There are certain indescribable constitutions, in which bones, more particularly, however, the os brachii, will not unite again after being broken. These temperaments are also very various; at least, I infer so from two subjects, to whom I paid particular attention. One was a strong, robust man, whose chief peculiarity seemed to be his indifference to pain: he had the ends of the broken os brachii cut down to, turned out, and sawn off, by Mr. Long, in St. Bartholomew's hospital, and the limb afterwards put in splints, and taken the greatest care of; but no union followed. The other case was a broken tibia and fibula, which remained disunited for about four months; but, afterwards, grew together. The latter subject was a complete instance of hypochondriasis. I have since seen a woman, under Sir James Earle, in the above situation, whose os brachii did not unite in the least, though it had been broken several months. Every attempt to move the bone occasioned excruciating torture. The woman died of some illness in the hospital, and, on dissecting the arm, the cause of the fracture not having united was found to arise from the upper, sharp, pointed extremity of the lower portion of the broken bone having been forcibly drawn up by the muscles, and penetrated the substance of the biceps, in which it still remained. I am indebted to Mr. Henry Earle for the account of the appearance on dissection, and I do not know, that this kind of impediment to the union of a fracture has been noticed by any writer, except Mr. Charles White, who appears to have conceived the possibility of the occurrence. (*Cases in Surgery, p.* 70. *Edit.* 1770.)

The causes of fractures remaining disunited, will, according to Richerand, be found to depend, either upon the broken ends of the bone not being properly in contact; upon the limb having been moved too much; upon the advanced age of the patient; or, upon the general inertia of the solids, and languor of the vital properties. (*Nosographie Chirurgicale, Tom.* 3, *p.* 37. *Edit.* 2.)

It is observed by M. Larrey, that the gun-

shot wounds of the extremities, complicated with fracture, especially with that of the humerus, received by the soldiers of the French army in Syria, were almost all followed by the formation of accidental joints. The two fragments of the broken bone continued moveable, their asperities and projecting angles having been destroyed by friction, and their ends being rounded and covered with a cartilaginous substance, so as to facilitate the motions, which the patients executed in various directions, in an imperfect manner, and without pain. M. Larrey acquaints us, that many invalids were sent back to France with such infirmity.

"I ascribe," says he, "the causes of these accidental articulations:

"1. To the continual motion, to which the wounded soldiers were exposed, after their departure from Syria, till their arrival in Egypt, in consequence of their having been obliged either to walk this journey on foot, or to be carried it on beasts.

"2. To the bad quality of the food, and the brackish water, which the men were under the necessity of drinking in this painful journey.

"3. To the quality of the atmosphere of Syria, almost entirely destitute of vital air, and impregnated with pernicious gases, issuing from the numerous marshes, near which, we were a long while stationed.

"All these causes may have prevented the formation of callus, either by diminishing the quantity of the phosphate of lime, or moving the bones out of that state of coaptation, in which they should constantly lie, in order to unite.

"Bandages, embrocations, rest, and regimen, proved quite ineffectual."—(*Larrey, Mémoires de Chirurgie Militaire, Tom.* 2, *p.* 131, 132.)

Here I believe it will be as well to consider at once the treatment of the preceding cases.

The diversity of the causes, which may be concerned in preventing the union of fractures, plainly shews, that the treatment should also be different in different cases.

When the want of union is ascribed to the ends of the fracture not being in a state of coaptation, and to their having been moved about too frequently, the obvious indications are, to set the fracture better, and to take adequate measures for keeping its extremities in contact and perfectly motionless.

When the advanced age of the patient seems to be the cause of the union not taking place, the application of the proper apparatus is to be continued a considerable time, since experience proves, that, in old subjects, the cure of fractures often requires many months. In such examples, also, tonic and cordial medicines, with a nutritive diet, are highly proper.

When several months have elapsed since the accident, and there is reason to apprehend, that a preternatural joint is formed, a variety of plans have been proposed and practised.

The most ancient method of treatment is that of forcibly rubbing the ends of the fracture against each other, so that the irritation may make them inflame, and take on a disposition to form callus. This plan was recommended by the late Mr. John Hunter, and has had the approbation of many other distinguished modern practitioners. Mr. Hunter used even to advise us, in the case of a disunited fracture of the leg, or thigh, to let the patient get up, and attempt to walk with the splints on the limb, so that the requisite irritation might be produced. The idea of exciting a degree of inflammation in the situation of the fracture, certainly appears exceedingly rational, and, I believe, the practice has been attended with a degree of success. Mr. White records an example, in which he cured a broken thigh on this principle, a strong leather case having been made for the limb. (*Cases in Surgery, p.* 75.) The method is spoken of in Celsus: *si vetustas occupavit, membrum extendendum est, ut aliquid lædatur: ossa inter se manu dimovenda, ut concurrendo exasperentur, et ut si quid pingue est, eradatur, totumque id quasi recens fiat*; &c.

The foregoing treatment, however, is only likely to answer, before a new joint is completely formed, and, when the limb has hitherto been kept entirely motionless.

When the case is old, and there is every cause for believing, that the fracture has been completely converted into a preternatural articulation, we have been advised to cut down to the ends of the bone, rasp or saw them off, and then treat the limb, just as if the case were a recent compound fracture.

This bold practice was first suggested by Mr. Charles White: "Robert Elliot, of Eyham, in Derbyshire, a very healthful boy of nine years old, had the misfortune, about midsummer, in the year 1759, by a fall, to fracture the humerus, near the middle of the bone. He was immediately taken to a bone-setter in that neighbourhood, who applied a bandage and splints to his arm, and treated him as properly," says Mr. White, "as I suppose he was capable of for two or three months. His endeavours, however, were by no means productive of the desired effect, the bones not being at all united. A surgeon of eminence, in Bake-

well, was afterwards called in; but as he soon found he could be of no service to him, and as the case was very curious, he advised the lad's friends to send him to the Infirmary at Manchester. He was accordingly brought thither the Christmas following, and admitted an in-patient. Upon examination we found it to be a simple oblique fracture, and, that the ends of the bone rode over each other: his arm was become not only intirely useless, but even a burthen to him, and not likely to be otherwise, as there was little probability that it could ever unite, it being now six months since the accident happened.

"Amputation was therefore proposed as the only method of relief; but I could not give my consent to it, for as the boy was young, and had a good constitution, it was hardly possible that it could be owing to any fault in the solids or fluids, but that either nature was disappointed in her work by frequent friction, while the callus was forming, or rather, that the oblique ends of the bone, being sharp, had divided a part of a muscle, and some portion of it had probably insinuated itself betwixt the two ends of the bone, preventing their union. Whichever of these might be the case, I was of opinon," continues Mr. White, "that he might be relieved by the following operation, viz. by making a longitudinal incision down to the bone, by bringing out one of the ends of it, which might be done with great ease as the arm was flexible, and cutting it off, either by the saw or cutting-pincers, then by bringing out the other, and cutting off that likewise, and afterwards by replacing them end to end, and treating the whole as a compound fracture.

"The objections made by the other gentlemen concerned, to this proposal, were, first, the danger of wounding the humeral artery by the knife. Secondly, the laceration of the artery by bringing out the ends of the bones. And, thirdly, that we had no authority for such an operation. As to the first, that was easily obviated, by making the incision on the side of the arm, opposite to the humeral artery. The place of election appeared to me to be at the external and lower edge of the deltoid muscle, as the fracture was very near to the insertion of that muscle into the humerus; the danger of wounding the vessel not only being by that means avoided, but, after the operation, while the patient was confined to his bed, the matter would be prevented from lodging, and the wound be easily come at, to renew the dressings. The second objection will not appear to be very great, when we consider that in compound fractures the bone is frequently thrust with great violence through the integuments, and seldom attended with laceration of any considerable artery; and as this would be done with great caution, that danger would appear very trifling. The third and last objection is no more than a general one to all improvements.

"This method which I have been proposing," proceeds Mr. White, "was at last resolved upon, and I assisted in the operation, which was performed, by a gentleman of great abilities in his profession, on January 3, in the present year (1760.) The patient did not lose above a spoonful of blood in the operation, though the tourniquet was not made use of. When the operation and dressings were finished, the limb was placed in a fracture-box, contrived on purpose, the lad confined to his bed, and the rest of the treatment was nothing different from that of a compound fracture.

"The wound was nearly healed in a fortnight's time, when an erysipelas came on, and spread itself all over the arm, attended with some degree of swelling; this by fomentations, and the antiphlogistic method, soon went off, and the cure proceeded happily, without any other interruption. In about six weeks after the operation the callus began to form, and is now quite firm. The arm is as long as the other, but somewhat smaller, in consequence of such long continued bandages; he daily acquires strength in it, and will soon be fit to be discharged." (*Cases in Surgery, by Charles White, F. R. S. p.* 69, *&c.*)

In another instance of a broken tibia, which continued disunited an extraordinary length of time, Mr. White practised an operation, somewhat similar to the foregoing one, with complete success. He made a longitudinal incision, about four inches in length, through the integuments, which covered the fracture. By the application of a trephine, he cut off the upper end of the bone, and, as the lower end could not be easily sawn off, he contented himself with scraping it. In the course of the subsequent treatment, he had occasion to take off, with the cutting-pincers, a small angle of tibia, and to touch the lower part of the bone with the butter of antimony, as well as to introduce the same caustic between the extremities of the fracture, in order to destroy a substance, which intervened. A trifling exfoliation followed. In twelve weeks, the bone was firmly united. (*Op. cit. p.* 81, 82.)

Besides Mr. White's cases, there are now some other instances, upon record, where the operation, which he has proposed, has succeeded. One is related by

Mr. Rowlands, of Chester: the operation was done for the cure of a fractured thigh, which had lost all disposition to unite. (See *Medico-Chirurgical Transactions, Vol.* 2, *p.* 47.)

M. Viguerie, principal surgeon of the Hôtel Dieu, at Toulouse, has also practised Mr. White's operation with success. (See *Larrey's Mémoires de Chirurgie Militaire, Tom.* 2, *p.* 132.)

On the other hand, the operation has frequently failed. In the instance, in which I saw it executed on the humerus by Mr. Long, in St. Bartholomew's Hospital, it did not answer, though the ends of the bone were most fairly sawn off, and the case treated with particular care and skill. Besides this example, I have heard of others, in which Mr. Cline and other practitioners have tried the experiment with no better success.

What is still more discouraging is, that the operation has sometimes proved fatal. (See *Richerand's Nosographie Chirurgicale, Tom.* 3, *p.* 39. *Edit.* 2. *Larrey's Mémoires de Chirurgie Militaire, Tom.* 2, *p.* 132.)

A modern proposal has lately been suggested: namely, to pass a seton through the new joint, with a view of exciting inflammation, and bringing about an union of the ends of the bone. This practice originated with a surgeon of Philadelphia, who has published an example, in which it succeeded. A Monsieur Rigal is likewise stated to have tried this plan in one instance with success: the callus formed, after the local irritation had been kept up for a month, by means of the seton. (See *Levéillé's Nouvelle Doctrine Chirurgicale, Tom.* 2, *p.* 201.)

The process, by which broken bones grow together again, is nearly of the same nature, as that, by which the soft parts are united in wounds. The only difference is, that in uniting a fracture, the vessels after a time deposite the phosphate of lime. The vessels, ramifying on the ends of the fracture, first effuse coagulating lymph. This gradually becomes vascular, and, in proportion as the vessels acquire the power of secreting earthy matter, it is by degrees converted into new bone, termed *callus*, which, from being at first soft and flexible, at length becomes firm and unyielding, like the original bone, and fit for constituting the future bond of union, between the two extremities of the fracture. In order that the first connecting substance may speedily become organized, and fitted for the formation of callus, nothing is so favourable as perfect quietude. Hence, the chief surgical indication, in the treatment of fractures, after the bones are replaced, is to keep them perfectly motionless: nature completes the rest. (See *Callus.*)

TREATMENT OF FRACTURES IN GENERAL.

The general doctrine, relative to fractures, is contained under the following heads, as part of the treatment of them.

Extension.
Counter Extension.
Coaptation, or Setting.
Application of Medicaments.
Deligation, or Bandage.
Position.
Prevention, or Relief of Accidents.

In the subsequent section of the present article, little more remains for us to do, than to follow Mr. Pott in his judicious observations on this part of practice.

It is very material to understand, how the ends of a fracture become displaced, because the greatest object in the treatment is to prevent such derangement The separation of the ends of the fracture, is not, however, an invariable occurrence; for fractures frequently take place, and yet no deformity is produced. When the tibia alone is fractured at its upper part, the shape of the limb is unaltered, because the diameter of the bone there is so great, and the surfaces of the fracture in contact so extensive, that they cannot be easily separated, and the unbroken fibula also aids in keeping the ends of the fracture from being displaced. A fracture of the upper thick part of the ulna alone is seldom deranged. In cases, however, in which both bones of the leg, or fore-arm, are broken, the ends of the fracture are commonly more or less displaced, and the limb consequently deformed.

The causes, and the varieties, of the derangement, attendant on fractures, form a most interesting subject.

In transverse fractures, the ends of the broken part cannot be deranged in the longitudinal direction, before they have been so much displaced, in the direction of the diameter of the bone, that no points of the fractured surfaces remain in contact.

But, when the fracture is oblique, and the surfaces not extensive, the derangement may happen in the direction of the axis of the bone, and the limb be shortened.

The third way, in which a fracture may be displaced, has not been much attended to; it is when the portions of the broken bone form an angle one with the other. In comminuted fractures this is most common; but, it also occurs both in simple fractures of the leg and thigh, when the foot is too much elevated, or depressed.

The fourth species of derangement is produced by a rotation of the inferior

fractured portion on the superior, as is very common in fractures of the thigh.

The bones being only passive instruments of loco-motion, possess not, in their own organization, any cause of the change of situation, which takes place, but yield to exterior causes, to the weight of the member, and to muscular contraction. The force producing the fracture may, in some instances, not merely break the bone, but, also, displace the ends of the broken part.

Of all the causes, however, which tend to separate the ends of a fracture from each other, the action of the muscles, is the most important, and difficult to counteract.

Mr. Pott, after censuring the violent extension, and counter-extension, indiscriminately practised and recommended by the old surgeons, proceeds to enquire, whence arose the evils and difficulties formerly encountered. "Neither extension, nor counter-extension, says he, can ever be necessary on account of the mere fracture, considered abstractedly. The broken ends of the bone, or bones, are of themselves inactive, and, if not acted upon by other parts, they would always remain motionless. When any attempt is made to put them into motion, they of themselves can make no possible resistance; nor can any be made on their part, save an accidental one arising from the points of the fracture being entangled with each other; and when they have been once, by the hand of the surgeon, placed properly and evenly with regard to each other, they would of themselves for ever remain so. What then is the reason why fractured bones always suffer a greater or a less degree of displacement? why is a broken limb almost always shorter than its fellow? what creates the resistance which we always find in attempting to bring the fractured parts aptly together? whence does it proceed, that when we have done all that is in our power (according to this mode of acting) the ends of the fracture will, in many cases, become again displaced, and lameness and deformity frequently ensue? In short, what are the parts or powers which act on the bones, and which, by so acting on them, produce all these consequences?

"These parts are the muscles, the only moving powers in an animal body. By the action of these on the bones, all locomotion is performed, and cannot be performed without them; and although all bones, when broken, are in some degree displaced and shortened, yet it will always be found, that in proportion as the muscles surrounding, or in connexion with a bone, are strong or numerous, or put into action by inadvertence or spasm, so will the displacement of the ends of such bone, when fractured, be. The even and smooth position of the fractured ends of a tibia, when the fibula of the same leg is entire and unhurt; that is, when the muscles therefore cannot act upon the former; the visible and immediate deformity, when both the beforementioned bones are broken nearly in the same place; that is, when the muscles can act upon, and displace such fracture; the great difficulty frequently met with, in endeavouring to get a broken os femoris to lie even tolerably smooth, and to prevent such broken limb from being much shorter than the other, are, among others which might be produced, such strong, and irrefragable proofs, as need no comment.

"From the muscles then, and from them only, proceeds all the difficulty which we meet with in making our extension; and by the resistance of these, and of these only, are we prevented from being always able to put the ends of a fractured bone immediately into the most apt contact.

"Let us in the next place consider, what it is which gives to a muscle, or to the principal muscles of a limb, the greatest power of resisting any force applied to them *ab externo*, in order to draw them out into greater length; for whatever that is, the same thing will be found to be the cause of the different degrees of resistance in setting a fracture.

"Does not the putting the muscles in a state of tension, or into a state approaching nearly to that of tension, almost necessarily produce this effect? or, in other words, does not that position of a limb, which puts its muscles into, or nearly into such a state, give such muscles an opportunity of exerting their greatest power, either of action, or of resistance? This I believe cannot be denied. On the other hand, what is the state or position of a muscle which is most likely to prevent it from acting, and to deprive it of most of its power of resistance or what is that position of a limb which, in the case of a broken bone, will most incapacitate the muscles from acting on, and displacing it; and in the greatest degree remove that resistance which they have it in their power to make to the attempts for the reduction of such fracture? Is it not obvious, that putting a limb into such position as shall relax the whole set of muscles, belonging to, or in connection with, the broken bone, must best answer such purpose? Nothing surely can be more evident. If this be granted, will it not, must it not follow, that such posture of a broken limb must be the best for making the reduction; that is, it must be that in which the muscles will resist the least, and be least likely to be

injured; that in which the broken bone will be most easily set, the patient suffer least pain in present, and that from which future lameness and deformity will be least likely to happen. A little attention to what frequently occurs, may perhaps serve to illustrate and confirm this doctrine better than mere assertion.

"What is the reason why no man, however superficially acquainted with his art, ever finds much trouble in setting a fractured os humeri, and that with very little pain, and a very small degree of extension? Is it not because both patient and surgeon concur in putting the arm into a state of flexion; that is, into such a state as relaxes all the muscles surrounding the broken bone? and is it not for the same reason that we so very seldom see (comparatively speaking of this bone with others) a deformity in consequence of a fracture of it? Let the reduction be attempted with the arm extended from the body, and the difficulty of setting will be much increased: let the arm be deposited in an extended straight position, and the fracture will be displaced and lie uneven.

"Apply the same kind of reasoning to the os femoris; that bone whose fracture so often lames the patient, and disgraces the surgeon.

"Will it not be more cogent, and more conclusive, in proportion as the muscles in connexion with this bone are more numerous and stronger? I would ask any man, who has been much conversant with accidents of this kind, what is the posture which almost every person (whose os femoris has been newly broken) puts himself into, in order to obtain ease, until he gets proper assistance? Do such people stretch out their limb, and place their leg and thigh straight, and resting on the calf and heel? I believe seldom or never. On the contrary, do not such people almost always bend their knee, and lay the broken thigh on its outside? and is not the reason, why this must be the most easy posture, obvious?

"From want of attention to, or from not understanding these few self-evident principles, many people permit their patients to suffer considerable inconvenience, both present and future.

"It is a maxim universally taught and received, that a fractured limb may be in such state as not to admit of the extension necessary for its being set; that is, if assistance be not at hand, when the accident happens; if they who bring the patient home, do it so awkwardly or rudely, as to bruise and hurt the part; if from drunkenness, folly or obstinacy in the patient, it happens that the limb is so disordered that it is found to be much swollen, inflamed, and painful, it is allowed not to be in a state to admit extension.

"This, I say, is a general maxim, and founded upon very just principles; but what is the general practice in consequence of it? It is, to place the limb in an extended, straight position, to secure it in that, and then by proper means, such as fomentation, poultice, &c. to endeavour to remove the tension and tumour. Now, if it be considered, that the swollen, indurated, and inflamed state of the muscles, is the circumstance which renders extension improper, surely it must be obvious, that such position of the limb as necessarily puts these very muscles in some degree on the stretch, must be a very improper one for the accomplishment of what ought to be aimed at. Under this method of treatment, the space of time which passes in the removal of the tension, is sometimes considerable; so considerable, that a happy and even coaptation becomes afterwards impracticable: and then this accident, which nine times in ten is capable of immediate relief, is urged as an excuse for unnecessary lameness and deformity.

"How then are we to conduct ourselves in such circumstances? The nature of the complaint points out the relief. Extension is wrong; a straight position of the thigh or leg is a degree of extension, and a still greater degree of it in proportion as the muscles are in such circumstances as to be less capable of bearing. Change of posture then must be the remedy, or rather the placing the limb in such manner as to relax all its muscles, must be the most obvious and certain method of relieving all the ills arising from a tense state of them: which change of posture will be attended with another circumstance of very great consequence; which is, that the bones may in such posture be immediately set, and not one moment's time be thereby lost; a circumstance of great advantage indeed! For, whatever may be the popular or prevailing opinion, it is demonstrably true, that a broken bone cannot be too soon put to rights; as must appear to every one who will for a moment consider the necessary state of the muscles, tendons, and membranes surrounding, and the medullary organs contained within, a large bone broken and unset; that is, lying in an uneven irregular manner. Can any truth be more clear, than that if the fracture, tension, and tumefaction be such, that the muscles cannot bear to be stretched out in the manner necessary for setting the broken bone without causing great pain, and perhaps bringing on still worse symptoms, the more the position of that limb makes its muscles approach toward a state of tension, the less likely it

must be that such symptoms should remit, and the longer it must be before the wished-for alteration can happen: and consequently, that while the accomplishment of such purpose is by every other means aimed at, the position of the limb ought most certainly to contribute to, and not to counteract it? In short, if the experiment of change of posture be fairly and properly made, the objections to immediate reduction, from tension, tumour, &c. will most frequently be found to be groundless; and the fracture will be capable of being put to rights, as well at first, as at any distance of time afterward."

For some criticisms on the foregoing remarks, relative to the relaxation of the muscles, in cases of fractures, the reader is referred to *Fractures of the Thigh*.

Mr. Pott next continues: "Extension having been made, and the broken ends of the bone having been placed as smooth and as even as the nature of the case will admit, the next circumstance to be attended to is the application of some medicament to the limb; particularly to the fractured part of it.

"The intention in applying any kind of external medicine to a broken limb is, or ought to be, to repress inflammation, to disperse extravasated blood, to keep the skin lax, moist, and perspirable, and at the same time to afford some, though very small degree of restraint or confinement to the fracture, but not to bind or press; and it should also be calculated as much as possible to prevent itching, an herpetic eruption, or an erysipelatous efflorescence. At St. Bartholomew's hospital, we use a cerate made by a solution of litharge in vinegar, which with soap, oil, and wax, is afterwards formed into such consistence as just to admit being spread without warming.

"This lies very easy, repels inflammation, is not adherent, comes off clean, and very seldom, if ever, irritates, or causes either herpes or erysipelas. But let the form and composition of the application made to the limb be what it may, one thing is clear, viz. that it should be put on in such manner, as that it may be renewed and shifted as often as may be necessary, without moving the limb in any manner: it being certain, that when once a broken thigh or leg has been properly put to rights, and has been deposited properly on the pillow, it ought not ever to be lifted up or moved from it again without necessity, until the fracture is perfectly united; and it is true, that such necessity will not very often occur. This may perhaps seem strange to those who are accustomed to roll simple fractures, and consequently to lift them up every three or four days, in order to renew such kind of bandage: but the necessity of this motion arises merely from the kind of bandage made use of, and not from any circumstance of the fracture itself. That the frequent motion of a fractured limb cannot possibly contribute to the ease of the patient, will, I suppose, be readily admitted; as I suppose also it will, that when a broken limb has been once deposited in the best position possible, it is impossible to mend that position merely by taking such limb up and laying it down again; from whence it must follow, that such kind of apparatus as necessitates the surgeon frequently to disturb the limb, cannot be so good as one that does not; provided the latter will accomplish the same kind of cure as the former: the truth of which position will appear in the most satisfactory manner to any, who will take a view of the method, in which simple fractures are treated at the before-mentioned hospital. Such application having been made as the surgeon thinks right, the next thing to be done is to put on a proper bandage.—That used by the ancients, and by the majority of the present practitioners, is what is commonly called a roller. This is of different length, according to the surgeon's choice, or as it may be used in the form of one, two, or more pieces. Hippocrates used three; (see *Fab. ab Aquapendente*, *Wiseman*, *Scultetus*, *Hildanus*, *Petit*, *Duverney*;) Celsus six; but the present people seldom use more than one. By such kind of bandage three intentions are aimed at, and said to be accomplished, viz. to confine the fracture, to repress or prevent a flux of humours, and to regulate the callus, (see *Duverney*:) but whoever will reflect seriously on this matter, will soon be convinced, that although some sort of bandage is necessary in every simple fracture, as well for preserving some degree of steadiness to the limb, as for the retention of the applications, yet none, nor either of these three ends can be answered merely, or even principally, by bandage of any kind whatever: and therefore, if this should be found to be true, that is, if it should appear, that whatever kind of deligation be made use of, it cannot be a principal, but only an accessory kind of assistance, and that in a small degree, and very little to be depended upon, it will follow that such kind of bandage as is most difficult to be applied with justness and exactitude, such as is soonest relaxed and out of order, such as stands most frequently in need of renewal, and, in such renewal, is most likely to give pain and trouble, must be more improper and less eligible, than one which is more easily applied,

less liable to be out of order, and which can be adjusted without moving the limb.

"The ancient method of applying the roller, in case of simple fracture of the leg or thigh, was to make (see *Fab. ab Aquapendente, and Wiseman,*) four or five turns round the fracture first, and then to continue the bandage upward and downward, until the whole limb was enveloped properly. This was done in this manner with a double view; to keep the broken ends of the bone in their place, and to prevent the influx of humour. Modern practitioners, although they have the same ends in view, generally begin their bandage from the inferior extremity of the limb, and continue it up to the top. Whether the old or the later method be followed, whether one or more rollers be made use of, the whole is executed while the limb is kept, by means of the assistants, in the same extended posture in which the coaptation was made, so that the whole bandage is finished before the leg is deposited on the pillow; in the doing all which, if from the tired state of the surgeon, or either of his assistants, or if, from the awkwardness, or unhandiness of any of the parties concerned, the true and exact position of the limb be at all deviated from, the ends of the bone will again be in some degree displaced, and the bandage, instead of being of use, will become prejudicial, by pressing hard on the inequalities of the fracture: to which let me add, that the roller, especially when applied to a leg, if it be not put on with due dexterity, that is, if it does not sit perfectly smooth and even, is the most unequal and worst kind of bandage in use.

"These objections, however just, are not the least to which the roller in the case of simple fracture of the leg or thigh are liable; for, as I have already hinted, it must, in a very short space of time, even while the parts surrounding the fracture are in the most tender and most painful state, be renewed, and that more than once; which renewal cannot be executed without again taking the limb off from the pillow, again committing it to the hands of assistants, and again running a risk of displacing the fracture: all which, not to mention the repetition of pain to the patient every time such operation is performed, and which must be at least every four or five days, are (as I have already said) very material objections to the roller, even in the most judicious and dexterous hands, and still more so in those of the rude and ignorant.

"The prevention of a flux of humours to a broken limb by bandage, is a common phrase: but they who use it have either no idea at all annexed to it, or a very erroneous one.

"If by the points and edges of the broken bone, the muscles and membranes be unavoidably wounded and torn, or if the same kind of mischief be incurred by the inadvertence or indiscretion of the patient, or of those who assisted in getting him home, or from the violence used in extending the limb and setting the fracture, inflammation must be excited, and pain and tumefaction will be the consequence; and these will continue for some time in every fracture; but that space will be longer or shorter in different cases, and under different circumstances: evacuation, rest, and a favourable position of the limb, will, and do in general, remove all these complaints; but bandage can contribute nothing more than by keeping the applications in their proper place; so far from it, that if the bandage be a roller, it must, by the frequent necessity of its being adjusted, and the frequent motion of the limb, in some degree counteract the proper intention of cure.

"The old writers are, in general, very precise as to the number of days during which the roller should be suffered to remain without being shifted; and the number of times which such shifting should be repeated within the first fortnight. (See *Fab. ad Aquapendente.*) This exactitude is by no means necessary; but if the bandage be supposed to be of any use at all, it is obvious, that it ought to be renewed or adjusted as often as it may cease to perform the office for which it is designed, or whenever it shall be found to counteract such office; that is, as often as it shall become so slack as not to contain the fracture at all; or whenever the limb shall be so swollen, that the roller makes an improper degree of stricture; the former generally occurs every four or five days; the latter is most frequent within the first week.

"In most of the writers on the subject of fractures, we also find marks or signs laid down for our information concerning the due or undue effect of the bandage on the limb. They tell us, that when that part of it which is below the termination of the roller, does not swell at all, that the bandage is not sufficiently strict, and will not retain the fracture; that when the same part is considerably swollen, or tense, or inflamed, it implies that the binding is too strait; and that a moderate degree of tumefaction is a sign that the deligation is properly executed. (See *Fabricius ab Aquapendente.*)

"In consequence of these precepts, many practitioners look more anxiously after this degree of tumefaction, than after the true and exact position of the

limb; and cannot be induced to believe, that any thing can be wrong under this appearance; although, if they would for once assume the liberty of thinking for themselves, they might be convinced, that even this degree of swelling is wrong; that it implies some kind of obstruction to the circulation, and cannot serve any good purpose; and consequently, that as far as it may be supposed to be the effect of bandage, so far that bandage must be faulty.

"The third purpose for which the roller is said to be used, is the regulation and restraint of the callus.

"If we were to form our notion of callus by what the generality of writers have said on this subject, we should suppose, that it was not only a particular juice always ready for the purpose, but that, if not restrained and regulated by art, it would always flow in such quantity, as to create trouble and deformity; that there were specific remedies for increasing or decreasing it; and that it always required the hand and art of surgery to manage it. That the callus is so far a particular juice, as that it consists of whatever is destined to circulate through the bones for their particular nourishment, is beyond all doubt; and that this gelatinous kind of fluid is the medium by which fractures are united, is as true; but that it requires art to manage it, or that art is in general capable of managing and directing it, is by no means true. That this callus or uniting medium does oftentimes create tumefaction and deformity, or even lameness, is true also; but the fault in these cases does not lie in the mere redundance of such juice; it is derived from the nature of the fracture, from the inequality of it when set, and from the unapt position of the broken ends with regard to each other; nor is surgery or the surgeon any otherwise blameable in this case, than as it was or was not originally in their power to have placed them better. It is the inequality of the fracture which makes both the real and apparent redundance of callus, and the tumefaction in the place of union. When a bone has been broken transversely, or nearly so, and its inequalities are therefore neither many nor great, when such broken parts have been happily and properly coaptated, and proper methods have been used to keep them constantly and steadily in such state of coaptation, the divided parts unite by the intervention of the circulating juice, just as the softer parts do, allowing a different space of time for different texture and consistence. When the union of a broken bone, under such circumstances, has been procured, the place where such union has been made will be very little perceptible, it will be no deformity, nor will it occasion any inconvenience. It will, indeed, be discoverable like a cicatrix of a wound in a softer part; but there will be no redundance of callus, because none will be wanted; neither will there be any necessity for any particular management on the part of the surgeon to repress or keep it in order: but when a bone has been broken very obliquely, or very unequally, when the parts of a fracture are so circumstanced as not to admit of exact coaptation, when such exact coaptation as the fracture perhaps would have admitted has not been judiciously made, when from unmanageableness, inadvertence, or spasm, the proper position of the limb has not been attended to or preserved, in all such cases there must be considerable inequality of surface; there must be risings on one side, and depressions on another; and in such cases the juices circulating through the bone, cannot accomplish the union in the same quantity, the same time, or in the same manner. The broken parts not being applied exactly to each other, there cannot be the same aptitude to unite; and according to the greater or lesser degree of exactitude in the coaptation, that is, according as the ends of the bones are, or have been, placed more or less even with regard to each other, will the inconvenience and the deformity be; and still most where the fracture is not set at all; but the broken ends of the bone unite laterally or by touching each other's sides. The reason of all this is so obvious, without having recourse to a particular specific juice under the name of callus, that it would be an insult upon the reader's understanding to explain it farther. The periosteum covering every fracture will remain thickened for some time, and a degree of fulness or rising will be thereby caused about the place where such fracture has been united; but time and the use of the muscles, soon in general remove this.

"In short, this doctrine of callus, considered as a particular kind of juice, and as being liable to great redundance, if not prevented by art, has not only misled many people, but has often been made use of as a cover to ignorance and neglect. When lameness and deformity have been the consequences of one or both these causes, more than of the nature and circumstances of a fracture, the callus has been found ready at hand to take the blame; and the ideal exuberance of this cement has often been urged as an excuse for real want of knowledge, or for gross neglect.

"The best and most useful bandage for

a simple fracture of the leg or thigh, is what is commonly known by the name of the eighteen-tailed bandage, or rather one made on the same principle, but with a little difference in the disposition of the pieces. The common method is to make it so, that the parts which are to surround the limb make a right angle with that which runs lengthways under it; instead of which, if they are tacked on so as to make an acute angle, they will fold over each other in an oblique direction, and thereby sit more neatly and more securely, as the parts will thereby have more connexion with and more dependence on each other. In compound fractures, as they are called, every body sees and acknowledges the utility of this kind of bandage preferably to the roller, and for very obvious and convincing reasons, but particularly because it does not become necessary to lift up and disturb the limb every time it is dressed, or every time the bandage loosens.

"The pain attending motion in a compound fracture, the circumstance of the wound, and the greater degree of instability of parts thereby produced, are certainly very good reasons for dressing such wound with a bandage, which does not render motion necessary; but I should be glad to know what can make it necessary, or right, or eligible, to move a limb in the case of simple fracture? what benefit can be proposed by it? what utility can be drawn from it? When a broken bone has been well set, and the limb well placed, what possible advantage can arise from moving it? surely none; but, on the contrary, pain and probable mischief. Is it not the one great intention, to procure unition? Can moving the limb every two or three days contribute to such intention? must it not, on the contrary, obstruct and retard it? Is not perfect quietude as necessary toward the union of the bone, in a simple as in a compound fracture? It is true, that in the one there is a wound which requires to be dressed, and the motion of the limb may in general be attended with rather more pain than in the other; but does motion in the simple fracture give ease, or procure more expeditious union?

"Every benefit then which can be supposed to be obtained from the use of the common bandage or roller, is equally attainable from the use of that which I have just mentioned, with one additional, and to the patient, most invaluable advantage, viz. that of never finding it necessary to have his leg or thigh once, during the cure, removed from the pillow on which it has been properly deposited. In short, to quit reasoning and speak to fact, it is the constant practice at St. Bartholomew's, and attended with all possible success. We always use the eighteen-tailed bandage; and never move the limb to renew or adjust it.

"The parts of the general apparatus for a simple fracture, which come next in order, are the splints.

"These are generally made of pasteboard, wood, or some resisting kind of stuff, and are ordered to be applied lengthways on the broken limb; in some cases three, in others four; for the more steady and quiet detention of the fracture.

"That splints, properly made and judiciously applied, are very serviceable, is beyond all doubt, but their utility depends much on their size, and the manner in which they are applied.

"The true and proper use of splints is, to preserve steadiness in the whole limb, without compressing the fracture at all. By the former they become very assistant to the curative intention; by the latter they are very capable of causing pain and other inconveniences; at the same time that they cannot, in the nature of things, contribute to the steadiness of the limb.

"In order to be of any real use at all, splints should, in the case of a broken leg, reach above the knee, and below the ankle; should be only two in number, and should be so guarded with tow, rag, or cotton, that they should press only on the joints, and not at all on the fracture.

"By this they become really serviceable; but a short splint, which extends only a little above and a little below the fracture, and does not take in the two joints, is an absurdity, and, what is worse, it is a mischievous absurdity.

"By pressing on both joints, they keep not only them, but the foot steady; by pressing on the fracture only, they cannot retain it in its place, if the foot be in the smallest degree displaced; but they may, and frequently do, occasion mischief, by rudely pressing the parts covering the fracture against the edges and inequalities of it.

"I suppose it will be said, that although short splints do not of themselves sustain and keep steady the two joints, and consequently the limb, yet that purpose in the broken leg may be and is fulfilled by junks, fanons, and other contrivances: to which I answer, that then the short splints are in that case of no use at all, and had better be laid aside; they should be used for no other purpose, but that of keeping the limb steady; and if they do not answer that end, they are an incumbrance, and multiply the articles in the apparatus for a fractured leg, very unnecessarily.

"In the case of a fractured os femoris, if the limb be laid in an extended posture, one splint should certainly reach from the hip to the outer ankle, and another (somewhat shorter) should extend from the groin to the inner ankle. In the case of a broken tibia and fibula, there never can be occasion for more than two splints, one of which should extend from above the knee to below the ankle on one side, and the other splint should do the same on the other side. The manner of applying them, if the limb be deposited in a state of flexion, will come under the next article.

"This, and indeed the most essential article in the treatment of a fracture, is, the position of the limb. Upon the judicious or injudicious, the proper or improper execution of this, depends the ease of the patient during his confinement, and the free use and natural appearance of his limb afterward.

"If I meant to describe, or if I approved(pardon the phrase)the common method of placing the broken leg and thigh in a straight manner, this would be the place to mention the many very ingenious contrivances and pieces of machinery, which practitioners, both ancient and modern, have invented for the purpose of keeping the whole limb straight and steady, that is, of keeping all the muscles surrounding the fractured bone constantly upon the stretch, and at the same time, of preventing any inequality in the union of it, and any shortening of the limb, in consequence of such inequality.

"But as it is my intention, by these sheets, to inculcate another, and, as it appears to me, a better disposition of the limb, in which such boxes, cradles, and pieces of machinery are not wanted, nor can be used, it is needless for me to say any thing about them.

"According to this plan, the fractured leg and thigh should be deposited on the pillow, in the very posture in which the extension was made, and the fracture set, that is, with the knee bent.

"I have already been so explicit, or perhaps prolix, on the tense and lax state of the muscles, as depending on posture, under the head of extension, that I shall spare the reader, as well as myself, a good deal of trouble by referring back to that article. All that is there urged, or that can be urged for making the extension, that is, for setting a fracture in such disposition of a limb or its muscles, is equally powerful and conclusive with regard to the manner of depositing and leaving it after it has been set. Whatever renders reduction and coaptation easy, must as necessarily maintain ease during the confinement, preserve rectitude of figure, and prevent displacement. The same principle must act on both occasions; and whether the doctrine be right or wrong, considered by itself, it must be equally so in both circumstances, that is, in the manner of setting a fracture, and in the manner of depositing the limb afterward. In the case of the fractured os humeri, the only position in which it can with any tolerable convenience to the patient be placed is, with the elbow bent, that very position which necessarily relaxes and removes all the resistance of the surrounding muscles. Daily experience evinces the utility of this, by our very seldom meeting with lameness or deformity after it, notwithstanding the prevailing apprehension of exuberant callus.

"The deformity frequently consequent to the fracture of the bones of the cubit, particularly that of the radius only, will generally, if not always, be found to be in proportion as the muscles concerned in the pronation and supination of the hand happened to be put more or less into a state of action or tension by the position of the limb.

"In the thigh, the case is still more obvious, as the muscles are more numerous and stronger.

"The straight posture puts the majority of them into action, by which action that part of the broken bone, which is next to the knee, is pulled upward, and by passing more or less underneath that part which is next to the hip, makes an inequality or rising in the broken part, and produces a shortness of the limb.

"In the fracture of both bones of the leg, the case is still the same; a straight position puts the muscles upon endeavouring to act; a moderate flexion of the knee relaxes them, and takes off such propensity.

"The disposition, therefore, of the broken cubit ought to be that which, by putting the hand into a middle state between pronation and supination, and by bending the fingers moderately, keeps the radius superior to the ulna; or, in other words, the palm of the hand should be applied to the breast, the thumb should be superior, the little finger inferior; and the hand should be kept in this posture constantly by means of two splints, which should reach from the joint of the elbow on each side, and should be extended below the fingers; or the same purpose may be still better answered by a simple neat contrivance of the very ingenious Mr. Gooch of Norfolk; of which he has given a draught, and which is preferable to a common splint, by its admitting the fingers to be more easily bent.

"Extension will be made with more facility, and coaptation more happily executed; a patient will suffer a great deal

less pain during these operations, as well as during the necessary confinement for a broken leg or thigh, and both patient and surgeon will be less likely to be disappointed in their intention and wish, that is, the former will be less liable to lameness or deformity, when a fractured thigh or leg has been treated in the way I have described, than in the common one.

"The resistance necessarily made by the muscles, joined to the great instability of parts in every species to fractured leg or thigh, except in the few where the bones are broken transversely, has constantly exercised the invention and ingenuity of practitioners, in devising means to prevent inequality in the callus as it is called, and shortness and deformity of the limb. Our books abound with draughts and descriptions of machines for this purpose; ligatures, pulleys, leaden weights and fracture-boxes, so constructed as to overcome and constantly to resist that action of the muscles surrounding the broken bone, that natural tendency in them to contract, which the extended position of the limb necessarily induces. Every body who has been conversant with matters of this sort knows, that even the best of these various contrivances often prove successless; and every one who will reflect ever so little, may see why they must be so. That they do prove ineffectual, the number of deformed legs and shortened thighs, which are daily met with, evinces; and that they must frequently prove so, will be obvious to every one, who will consider that the effect can last no longer than the cause is continued, unless there happens to be some very favourable circumstance in the fracture itself. What I mean is this; when the reduction of the fracture is set about, the limb is put into such position, that the surrounding muscles resist the extending force very considerably, and this in proportion to their strength and number: that force is continued and increased till the muscles give way, and the resistance being overcome, an opportunity is thereby obtained of placing the ends of the fracture in as apt position with regard to each other as the nature of it will admit. If the fracture be of the transverse kind, that is, if the ends of the broken bone be large, and afford a good deal of space for contact with each other, such apposition will contribute a good deal to the keeping the limb steady, and the fracture even; but if the fracture be of the oblique kind, if there be several loose pieces, and consequently neither large contact nor stability from the apposition, or if due extension has not been made, or could not, or if the ends of the bones have not been judiciously and properly set, the muscles will act as soon as the extension is relaxed, the fracture will be more or less displaced, according to the nature of it, the limb will be shortened, the time of union will be prolonged, and the place of it (the callus, as it is called,) will be in proportion more or less unequal.

"I take it for granted that it will be asked, have not our ancestors at all times happily redressed fractured legs and thighs, by the method which they have delivered down to us, and which in the preceding pages I have taken the liberty to object to? have not such limbs frequently been rendered as straight, as useful, and as little deformed as possible? I answer, most certainly, yes; it is an undoubted truth, and cannot be denied. But in my turn, let me be permitted to ask, whether in the same method, great and even unsurmountable difficulty is not frequently met with? whether in many cases the act of setting, as it is called, is not excessively painful at the time, and productive of inflammation and other disagreeable symptoms afterward? and, whether, in spite of all care, of every contrivance, of every species of machinery which has yet been used, broken thighs and legs are not often, very often, left deformed, crooked, and shortened, and that merely from the action of the muscles, and the obliquity or shattered state of the fracture? The fact is notorious, and the sole question is, whether or no a different disposition of the parts, preventing such action and such resistance, will in many instances prevent these evils? To which, from repeated experience, I answer yes. If this should be found to be the case in general, of which I make no doubt that it is; if by this method, many of such unfortunate cases, as in the common method of treatment disappoint both patient and surgeon, should be found in general to succeed so well as to satisfy both, it will prove all I wish it should prove. Superior utility and more frequent success are all I contend for.

"Many people did very well under amputation before the double incision was practised; but is the double incision therefore no improvement? The operation for the bubonicele may be performed with that clumsy instrument the probe scissars, but is the bistoury therefore not preferable? A surgeon may cut off some ounces, or even pounds of flesh from a patient's backside, in order to cure a sinus, but is the cure by the simple division of that sinus therefore not easier or more expeditious? Neither of these can, I think, be proved, unless it can at the same time be proved, that pain is no evil, confinement not at all irksome, and that deformity and elegance of figure are synonymous terms.

"Let not the reader fancy that I would

dare to amuse him with speculation, or merely specious reasoning on a subject like this. What I have said is from experience, repeated experience, both of myself and of others for a considerable length of time past, and on a great variety of subjects; from an experience which has perfectly satisfied me, and I think will every man who will make the trial fairly and candidly.—I do not pretend to say, that by these means every kind of broken bone will infallibly and certainly be brought to lie smooth, even, and of proper length; if I did, they who are versed in these things, would know that I said too much: but I will say, (what is sufficient for my purpose) that it will not only succeed in all those, in which the old method can ever be successful; but also in the majority of those in which it is not, nor in the nature of things can. In those fortunate cases, in which either method will do, the old one is fatiguing, inconvenient, and even sometimes offensive, from the supine and confined posture of the patient; whereas that which is here proposed, gives the patient much greater liberty of motion for every purpose either of choice or necessity; and in many of those cases, wherein the old method proves most frequently so far successless, as to leave the limb short, lame, or deformed; I say, in most of these, the proposed method will not be attended with these inconveniences.

"I have already said, that in most cases of broken thigh or leg, the method just described will be attended with great success; but there is one particular case in which its utility is still more conspicuous; a case which, according to the general manner of treating it, gives infinite pain and trouble both to the patient and surgeon, and very frequently ends in the lameness and disappointment of the former, and the disgrace and concern of the latter: I mean the fracture of the fibula attended with a dislocation of the tibia.

"Whoever will take a view of the leg of a skeleton, will see that although the fibula be a very small and slender bone, and very inconsiderable in strength, when compared with the tibia, yet the support of the lower joint of that limb (the ankle) depends so much on this slender bone, that without it the body would not be upheld, nor locomotion performed, without hazard of dislocation every moment. The lower extremity of this bone, which descends considerably below that end of the tibia, is by strong and inelastic ligaments firmly connected with the last-named bone, and with the astragalus, or that bone of the tarsus which is principally concerned in forming the joint of the ankle. This lower extremity of the fibula has, in its posterior part, a superficial sulcus for the lodgment and passage of the tendons of the peronei muscles, which are here tied down by strong ligamentous capsulæ, and have their action so determined from this point or angle, that the smallest degree of variation from it, in consequence of external force, must necessarily have considerable effect on the motions they are designed to execute, and consequently distort the foot. Let it also be considered, that upon the due and natural state of the joint of the ankle, that is, upon the exact and proper disposition of the tibia and fibula, both with regard to each other and to the astragalus, depend the just disposition and proper action of several other muscles of the foot and toes; such as the gastrocnemii, the tibialis anticus, and posticus, the flexor pollicis longus, and the flexor digitorum pedis longus, as must appear demonstrably to any man who will first dissect, and then attentively consider these parts.

"If the tibia and fibula be both broken, they are both generally displaced in such manner, that the inferior extremity, or that connected with the foot, is drawn under that part of the fractured bone which is connected with the knee; making by this means a deformed, unequal tumefaction in the fractured part, and rendering the broken limb shorter than it ought to be, or than its fellow. And this is generally the case, let the fracture be in what part of the leg it may.

"If the tibia only be broken, and no act of violence, indiscretion, or inadvertence be committed, either on the part of the patient or of those who conduct him, the limb most commonly preserves its figure and length; the same thing generally happens if the fibula only be broken, in any part of it between its upper extremity, and within two or three inches of its lower one.

"Two kinds of fracture there are, and only two that I can recollect (relative to the limbs) which do not admit of the bent position of the joints, I mean that of the processus olecranon at the elbow, and that of the patella; in these a straight position of the arm and leg is necessary; in the former to keep the fractured parts in contact till they are united; in the latter, to bring them as near to each other as may best serve the purpose of walking afterward.*

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* "Although a straight position of the limb is necessary for the broken patella, yet this very position becomes so upon the same principle, as renders the bent posture most advantageous in the broken tibia and femur, viz. the relaxation of the mus-

"With regard to the fracture of the patella, an opinion has long and generally prevailed, which seems to me to have no foundation in truth, or (when duly considered) even in probability; it is, that the great degree of stiffness in the joint of the knee, which is sometimes found to be the consequence of this kind of fracture, is owing to, or produced by, a quantity of callus falling into it from the edges of the broken bone: and that the nearer the broken pieces are brought to each other, the more likely such consequence is.

"Every part of this doctrine seems equally absurd. In the first place, the fractured bone is by no means capable of supplying such a quantity of callus as to produce this end, unless it may be supposed to run from it as solder from a plumber's ladle; in the second place, if this was the case, the most likely, and indeed the only probable way of preventing the deposition of such juice, must be by bringing the broken pieces into close contact; and in the third place, there is no authority from the appearance of such joints after death, (at least as far as my experience goes) to suppose this to be the case, or to countenance such opinion. The cause therefore of this rigidity, which is now and then found to attend the broken patella, must be sought for elsewhere, viz. in the long rest and confinement of the joint as a means used by many to procure exact union; in mischief done to the ligament, which is formed by the united tendons of the four extensor muscles of the leg, at the time of and by the

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cles and tendons attached to the fractured bone.

"Whoever will for a moment attend to the disposition of the pieces in a patella, which has been broken transversely, will see how little necessary or useful the many contrivances of bandages, straps, compresses, buckles, buttons, &c. to be found in writers are, especially all that part of them which are applied to the inferior fragment.

"By the action of the united tendons of the extensores muscles of the leg, the superior fragment is pulled upward and separated from the inferior, but the latter remains nearly, if not absolutely, where it was before the accident; there is nothing to act upon it, and therefore it cannot, nor does it move.

"The extension of the leg puts the muscles attached to the upper part of the broken bone into a state of relaxation, and prevents their acting; and though a small compress just above this piece, with a moderate bandage, may be useful toward retaining it, yet it is the position of the leg, which must keep the broken piece down, and effect the cure." (*Pott.*)

fracture; and in the nature of the fracture itself, that is, the manner in which the bone shall happen to be broken.

"But, be all this as it may, the fact undoubtedly is, that they walk best after such accident, whose patella has been broken transversely, and that into two nearly equal fragments; whose confinement to the bed has been short, that is, no longer than while the inflammation lasted; whose knee, after such period, has been daily and moderately moved; and in whom the broken pieces are not brought into exact contact, but lie at some small distance from each other.

"I cannot take leave of this subject of simple fractures, without mentioning a circumstance relative to them, which although, when rightly understood, is of little or no importance, yet by being misunderstood, becomes frequently of considerable consequence.

"I mean, the use of the term, *rising end of a broken bone*.

"By the expression, any one unacquainted with these things would be inclined to think, that the prominent part of a broken bone rose, or was elevated from its natural place; and became, by such rising, superior to the other part or extremity of the fracture. This would certainly be the idea of an ignorant person, and as such would be of little consequence; but by the practice of many, who call themselves surgeons, it is as certainly their idea also, and this renders it a matter of great consequence. Many instances are producible, in which our conduct is in great measure regulated by the language which we use. Having no ideas annexed to our words, leads us into absurdity and unintelligibility; but false ones influence us still more, and frequently produce very material errors.

"The fistula lachrymalis, the fistula in perinæo, and that in ano, are glaring proofs of this; and my present subject is full as much so: for upon the erroneous idea annexed to the term *rising end*, stands all the absurd practice of compress, bolster, and strict bandage, in the cases of simple fracture.

"The truth is, that there is really no *rising end* to a broken bone; I mean, when applied, as the term usually is, to the leg, thigh, and clavicle. There is indeed a superior or prominent end or part, and an inferior or depressed one, but the former of these is in its proper place, from which it cannot by art be moved; and the latter, which is not in its proper place, is very capable by art of being put into it.

"Perhaps this may to some appear a mere play of words, a nominal distinction, without a real difference; but when the influence, which a right, or wrong idea of this produces on practice, is attended to,

the consequence will be obvious and serious.

"When a collar-bone, os femoris, or tibia and fibula are broken, by the action of the muscles, by the motions of the patient, and by the mere weight of the inferior part of the arm, thigh, or leg, the fractured ends of such bones are displaced, and always displaced in such manner, that the inequality occasioned necessarily by such displacement, proceeds from the inferior end of the fractured bone being retracted or drawn under the superior; this produces a tumefaction or unequal rising, and the upper extremity of the fracture is therefore called the rising end of it. Now the man who regards this rising end as that part of the fracture which has by such rising got out of its place, and not as having accidentally become the prominent part merely by the insinuation or retraction of the other part underneath it, will go to work with bolster, compress, and bandage, in order to bring and keep such end down; by which means he will give his patient considerable pain, and while he depends on such means alone, will most certainly be frustrated in his intention and expectation, the means not being adequate to the proposed end. But the man who looks on this in the true light, that is, who looks on the superior part in its proper place, and the inferior as being displaced by the weight of the limb, and the action of the muscles, will know, that by the mere position of such limb, he shall be able to remedy all the inconvenience and deformity, as far as they are by art capable of remedy, without the parade or the fatigue of useless apparatus.

"He will, for example, know that the prominent part of a broken clavicle, that part of it which is next to the sternum, is just where it should be; and that the inferior part, that which is connected with the scapula, is out of its place, by being drawn down by the weight of the arm; and therefore instead of loading, as is usual, the prominent part with quantities of compress, which never can do any service, he, by a proper elevation of the arm, will bring the lower end upward into contact with the other; and thereby, with very little trouble, easily accomplish what he never can do in any other manner, however operose.

"The same thing will happen from the same principles in the leg and thigh; a prominence, or a rising end, there always will be, but that rising end is never to be brought down by any pressure from compress or bandage; the fallen or inferior one must always be brought up to it by the proper position of the rest of the limb: this will always remove the inequality as far as it is removeable, and nothing else can *."

COMPOUND FRACTURES.

"I use the term compound fracture, (says Mr. Pott) in the sense in which the English have always used it; that is, to imply a broken bone complicated with a wound.

"In this kind of case the first object of consideration is, whether the preservation of the fractured limb can, with safety to the patient's life, be attempted; or, in other words, whether the probable chance of destruction, from the nature and circumstances of the accident, is not greater than it would be from the operation of amputation. Many things may occur to make this the case. The bone, or bones, being broken into many different pieces, and that for a considerable extent, as happens from broad wheels, or other heavy bodies of large surface, passing over, or falling on such limbs; the skin, muscles, tendons, &c. being so torn, lacerated, and destroyed, as to render gangrene and mortification the most probable and most immediate consequence; the extremities of the bones forming a joint being crushed, or as it were comminuted, and the ligaments connecting such bones being torn and spoiled, are, among others, sufficient reasons for proposing and for performing immediate amputation. Reasons, which (notwithstanding any thing that may have been said to the contrary) long and reiterated experience has approv-

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* "In a profest regular treatise on this subject, it would be right to take notice of what may be called the infortunia, or accidental evils, which sometimes accompany even simple fractures: such are, disease arising from injury done to the medullary membrane, within the bones, in bad habits: hemorrhage, or a species of spurious aneurism, from a wound of the interosseal artery, between the tibia and fibula, or of either of the carpal arteries: mischief from the fracture becoming accidentally the seat of the crisis of a fever: deficiency of callus, or the accident of the broken bone not uniting: the fractured limb becoming the seat of an erysipelas, terminating in a slough of the common membrane and periosteum: the gelatinous juice or callus, which should unite the fracture, being in so morbid a state, as to produce a kind of caries with exostosis, instead of its doing its proper duty, &c. Of all these there are examples, but they do not come within the plan which I prescribed to myself when I began these papers." (*Pott.*)

ed, and which are vindicable upon every principle of humanity, or chirurgic knowledge.

"When a surgeon says, that a limb, which has just suffered a particular kind of compound fracture, ought rather to be immediately cut off, than that any attempt should be made for its preservation, he does not mean by so saying, that it is absolutely impossible for such limb to be preserved at all events; he is not to be supposed to mean so much in general, though sometimes even that will be obvious; all that he can truly and justly mean is, that from the experience of time it has been found, that the attempts to preserve limbs so circumstanced, have most frequently been frustrated by the death of the patients, in consequence of such injury; and that from the same experience it has been found, that the chance of death from amputation is by no means equal to that arising from such kind of fracture.

"Every man knows, that apparently desperate cases are sometimes cured; and that limbs so shattered and wounded, as to render amputation the only *probable* means for the preservation of life, are now and then saved. This is an uncontroverted fact, but a fact which proves very little against the common opinion; because every man of experience also knows, that such escapes are very rare, much too rare to admit of being made precedents, and that the majority of such attempts fail.

"This consideration relative to amputation is of the more importance, because it most frequently requires immediate determination; every minute of delay is, in many instances, to the patient's disadvantage; and a very short space of time indeed, frequently makes all the difference between probable safety and fatality. If these cases in general would admit of deliberation for two or three days, and during that time such circumstances might be expected to arise, as ought necessarily to determine the surgeon in his conduct, without adding to the patient's hazard, the difference would be considerable; the former would not seem to be so precipitate in his determination, as he is frequently thought to be; and the latter, being more convinced of the necessity, would submit to it with less reluctance. But unhappily for both parties, this is seldom the case; and the first opportunity having been neglected or not embraced, we are frequently denied another. Here therefore the whole exertion of a man's judgment is required, that he may neither rashly and unnecessarily deprive his patient of a limb, nor through a false tenderness and timidity, suffer him to perish, by endeavouring to preserve such limb. Some degree of address is also necessary upon such occasion, in order to convince the patient, that what seems to be determined upon hastily and with precipitation, will not safely admit of longer deliberation.

"The limb being thought capable of preservation, the next consideration is the reduction of the fracture. The ease or difficulty attending this, depends not only on the general nature of the case, but on the particular disposition of the bone with regard to the wound.

"If the bone be not protruded forth, the trouble of reducing, and of placing the fracture in a good position, will be much less than if the case be otherwise: and in the case of protrusion or thrusting forth of the bone or bones, the difficulty is always in proportion to the comparative size of the wound, through which such bone has passed. In a compound fracture of the leg or thigh, it is always the upper part of the broken bone which is thrust forth. If the fracture be of the transverse kind, and the wound large, a moderate degree of extension will in general easily reduce it; but if the fracture be oblique, and terminates, as it often does, in a long sharp point, this point very often makes its way through a wound no larger than just to permit such extension. In this case, the very placing the leg in a straight position, in order to make extension, obliges the wound or orifice to gird the bone tight, and makes all that part of it, which is out of such wound, press hard on the skin of the leg underneath it. In these circumstances, all attempts for reduction in this manner will be found to be impracticable; the more the leg is stretched out, the tighter the bone will be begirt by the wound, and the more it will press on the skin underneath.

"Upon this occasion, it is not very unusual to have recourse to the saw, and by that means to remove a portion of the protruded bone.

"I will not say that this is always or absolutely unnecessary or wrong, but it most certainly is frequently so. In some few instances, and in the case of extreme sharp-pointedness of the extremity of the bone, it may be, and undoubtedly is right: but, in many instances, it is totally unnecessary.

"The two most proper means of overcoming this difficulty are, change of posture of the limb, and enlargement of the wound. In many cases the former of these, under proper conduct, will be found fully sufficient; and where it fails, the latter should always be made use of. Whoever will attend to the effect, which putting the leg or thigh (having a com-

pound fracture and protruded bone) into a straight position always produces; that is, to the manner in which the wound in such position girds the bone, and to the increased difficulty of reduction thereby induced, and will then, by changing the posture of such limb from an extended one, to one moderately bent, observe the alteration thereby made, in both the just-mentioned circumstances, will be satisfied of the truth of what I have said, and of the much greater degree of ease and practicability of reduction in the bent, than in the extended position; that is, in the relaxed, than in the stretched state of the muscles. Reduction being found impracticable, either by extension or change of posture, the obvious and necessary remedy for this difficulty is enlargement of the wound. This to some practitioners, who have not seen much of this business, appears a disagreeable circumstance, and therefore they endeavour to avoid it; but their apprehensions are in general groundless and ill-founded: in enlarging the wound there is neither difficulty nor danger, it is the skin only which can require division, and in making such wound there can be no possible hazard. It is needless to say that the division should be such as to render reduction easy; or to remind the practitioner, that such enlarged opening may serve very good future purposes, by making way for the extraction of fragments, and the discharge of matter, sloughs, &c.

"If the bone be broken into several pieces, and any of them be either totally separated, so as to lie loose in the wound, or if they be so loosened and detached, as to render their union highly improbable, all such pieces ought to be taken away; but they should be removed with all possible gentleness, without pain, violence, or laceration, without the risk of hemorrhage, and with as little poking into the wound as possible. If the extremities of the bone be broken into sharp points, which points wound and irritate the surrounding parts, they must be removed also. But the whole of this part of the treatment of a compound fracture should be executed with great caution; and the practitioner should remember, that if the parts surrounding the fracture be violated, that is, be torn, irritated, and so disturbed as to excite great pain, high inflammation, &c. it is exactly the same thing to the patient, and to the event of the case, whether such violence be the necessary consequence of the fracture, or of his unnecessary, and awkward manner of poking into, and disturbing the wound. The great objects of fear and apprehension in a compound fracture, (that is, in the first or early state of it) are, pain, irritation, and inflammation; these are to be avoided, prevented, and appeased by all possible means, let every thing else be as it may; and although certain things are always recited, as necessary to be done, such as removal of fragments of bone, of foreign bodies, &c. &c. &c. yet it is always to be understood, that such acts may be performed without prejudicial or great violence, and without adding at all to the risk or hazard necessarily incurred by the disease.

"Reduction of, or setting a compound fracture is the same as in the simple; that is, the intention in both is the same, viz. by means of a proper degree of extension to obtain as apt a position of the ends of the fracture with regard to each other, as the nature of the case will admit, and thereby to produce as perfect and as speedy union as possible.

"To repeat in this place what has already been said under the head of Extension would be tedious and unnecessary. If the arguments there used for making extension, with the limb so moderately bent as to relax the muscles, and take off their power of resistance, have any force at all, they must have much more when applied to the present case: if it be allowed to be found very painful to extend, or to put or keep on the stretch, muscles which are not at all or but slightly wounded, and only liable in such extension to be pricked and irritated, it is self-evident that it must be much more so when the same parts are torn and wounded considerably: when the ends of the fractured bone have made their way quite through them, divided the skin, and laid all open to the access of the air.

"Every consequence, which does, or may be supposed to flow from wound, pain, or irritation, in consequence of violence, must necessarily be much greater, when a lacerated wound, and that made by the bone, is added to the fracture; not to mention the ills arising from extending or stretching out muscles already torn or half divided.

"One moment's reflection must be sufficient to convince any reasonable man: but experience is the only proper test of all these kinds of things. Let this method of treatment, then, be fairly and properly subjected to it; and if the great advantage of the one over the other does not appear, that is, if the less sensation of pain by the patient, and the more happy, more perfect, and more expeditious accomplishment of his purpose by the surgeon, do not determine greatly in favour of relaxed position, I am, and have for a considerable length of time, been greatly mistaken.

"The wound dilated, (if necessary) loose pieces removed, (if there were any) and the fracture reduced, and placed in

the best possible position, the next thing to be done is to apply a dressing.

"On this subject a great deal has been said by writers, particularly by such of them as have implicit faith in external applications; but, in order to be able to execute this part of the process properly, a man has only to ask himself, What are the intentions which, by any kind of dressing to a compound fracture, he means to aim at the accomplishment of? And a rational answer to this will give him all that he can want to know.

"The dressing necessary in a compound fracture is of two kinds, viz. that for the wound, and that for the limb. By the former, we mean to maintain a proper opening for the easy and free discharge of gleet, sloughs, matter, extraneous bodies, or fragments of bone, and this in such manner, and by such means, as shall give the least possible pain or fatigue, shall neither irritate by its qualities, nor oppress by its quantity, nor by any means contribute to the detention or lodgment of what ought to be discharged. By the latter, our aim should be the prevention or removal of inflammation, in order, if the habit be good, and all other circumstances fortunate, that the wound may be healed, by what the surgeons call the first intention, that is, without suppuration or abscess; or, that not being practicable, that gangrene and mortification, or even very large suppuration may be prevented, and such a moderate and kindly degree of it established as may best serve the purpose of a cure. The first therefore, or the dressing for the wound, can consist of nothing better, or indeed so good, as soft dry lint, laid on so lightly as just to absorb the sanies, but neither to distend the wound, or be the smallest impediment or obstruction to the discharge of matter. This lint should be kept clear of the edges, and the whole of it should be covered with a pledget spread with a soft easy digestive. The times of dressing must be determined by the nature of the case; if the discharge be small or moderate, once in twenty-four hours will be sufficient; but if it be large, more frequnt dressing will be necessary, as well to prevent offence, as to remedy the inconveniences arising from a great discharge of an irritating sharp sanies.

"The method of treating the limb, with a view to the prevention of such accidents and symptoms, as pain, inflammation, and laceration of parts, are likely to produce, is different with different practitioners; some using from the very first, relaxing, greasy applications; others applying medicines of very different nature. Both these may be right conditionally, that is, according to different circumstances in the case, but they cannot be equally so in the same circumstances.

"Many practitioners are accustomed to envelope compound fractures in a soft, warm, relaxing cataplasm from the very first: whether the limb be in a tense swollen state, or not. This, if I may take the liberty of saying so, appears to me to be injudicious. When from neglect, from length of time passed without assistance, from misconduct or drunkenness in the patient, from awkwardness and unhandiness in the assistants, or from any other cause, a tension has taken possession of the limb, and it is become tumid, swollen and painful, a warm cataplasm is certainly the best and most proper application that can be made, and that for very obvious reasons; the state of the parts under these circumstances is such, that immediate union is impossible, and nothing but a free and plentiful suppuration can dissipate or remove impending mischief: every thing therefore which can tend toward relaxing the tense, swollen, and irritable state of the parts concerned, must necessarily be right; the one thing aimed at, (plentiful suppuration) cannot be accomplished without it. But when the parts are not in this state, the intention seems to be very different. To relax swollen parts, and to appease pain and irritation by such relaxation, is one thing; to prevent inflammatory defluxion and tumefaction, is certainly another; and they ought to be aimed at by very different means. In the former, a large suppuration is a necessary circumstance of relief, and the great means of cure; in the latter it is not, and a very moderate degree of it is all that is required. The warm cataplasm therefore, although it be the best application that can be made use of in the one case, is certainly not so proper in the other, as applications of a more discutient kind, such as mixtures of spirit. vini, vinegar and water, with crude sal ammoniac, spirit. mindereri, acet. litharg. and medicines of this class, in whatever form the surgeon may choose. By these, in good habits, in fortunately circumstanced cases, and with the assistance of what should never be neglected, (I mean phlebotomy*, and the general antiphlogistic regimen,) inflammation may sometimes be kept off, and a cure accomplished, without large collections or discharges of matter, or that considerable degree of suppuration, which, though necessary in some cases, and almost unavoidable in others, are and must be ra-

* Bleeding is now not frequently practised, except on very plethoric persons, and out of large cities.

ther promoted and encouraged, than retarded, or prevented, by warm relaxing applications of the poultice kind.

" Compound fractures in general require to be dressed every day; and the wounded parts not admitting the smallest degree of motion without great pain, perfect quietude becomes as necessary as frequent dressing.

" The common bandage therefore (the roller) has always in this case been laid aside, and what is called the eighteen-tailed bandage substituted, very judiciously, in its place. Of this I have already spoken so largely, as to make repetition unnecessary.

" Splints, that is, such short ones as are most commonly made use of in simple fractures, are by all forbid in the compound, and that for the same reason which ought to have prevented them from having ever been used in the former, viz. because the probable good to be derived from them can be but little; and the probable mischief is obvious and considerable.

" But although short splints are for many reasons palpably improper, in both cases, yet those of proper length, those which reach from joint to joint, comprehend them both, and are applied on each side of the leg only, are very useful both in the simple and in the compound fracture, as they may, thus applied, be made to keep the limb more constantly steady and quiet, than it can be kept without them.

" With regard to position of the limb, I have already been so explicit, when speaking of the simple fracture, that to say any thing more about it here would be an abuse of the reader's time and patience. The only, or the material difference between a simple and a compound fracture, as far as relates to this part of the treatment, is, that as the parts surrounding the broken bone in the latter are more injured, and consequently more liable to irritation, pain, inflammation, and all their consequences, therefore every method and means, by which the alleviation of such symptoms, and the prevention of such consequences can be obtained, is still more necessary and requisite. Among these, the posture of the limb is so principal a circumstance, that without its concurrence every other will be fruitless. The points to be aimed at are, the even position of the broken parts of the bone, and such disposition of the muscles surrounding them, as is most suitable to their wounded, lacerated state, as shall be least likely to irritate them, by keeping them on the stretch, or to produce high inflammation, and at best large suppuration. These, I say, are the ends to be pursued; and how much the position of the limb does, and must necessarily contribute to the advantage, or disadvantage just recited, must be so obvious to any body capable of reflection, that nothing more need be said about it.

" At the beginning of these sheets, I have said, that it was not my intention to write a regular treatise, but only to throw out a few hints which I hoped might prove useful to such as have not yet received better information. The part of my subject at which I am now arrived, does not indeed admit of much more: a few general precepts are all which a writer can give; the particular method of conducting each particular case must be determined by the nature of that case, and by the judgment of the surgeon.

" Every body knows, or ought to know, that these cases, of all others, require at first the most rigid observance of the antiphlogistic regimen; that pain is to be appeased, and rest obtained, by anodynes; that inflammation is to be prevented or removed, by free and frequent bleeding, by keeping the body open, and by the administration of such medicines as are best known to serve such purposes.—And that, during this first state or stage, the treatment of the limb must be calculated, either for the prevention of inflammatory tumefaction, by such applications as are in general known by the title of discutients; or, such tumour and tension having already taken possession of the limb, that warm fomentation, and relaxing and emollient medicines are required.

" If these, according to the particular exigence of the case, prove successful, the consequence is, either a quiet easy wound, which suppurates very moderately, and gives little or no trouble; or a wound, attended at first with considerable inflammation, and that producing large suppuration, with great discharge, and troublesome formation and lodgment of matter. If, on the other hand, our attempts do not succeed, the consequence is gangrene and mortification.

" These are the three general events or terminations of a compound fracture, and according to these must the surgeon's conduct be regulated.

" In the first instance, he has indeed nothing to do but to avoid doing mischief, either by his manner of dressing, or by disturbing the limb. Nature let alone, will accomplish her own purpose; and art has little more to do than to preserve the due position of the limb, and to take care, that the dressing applied to the wound proves no impediment.

" In the second stage, that of formation and lodgment of matter, in consequence of large suppuration, all a surgeon's judgment will sometimes be required in the treatment both of the patient

and his injured limb. Enlargement of the present wound, for the more convenient discharge of matter*; new or counter-openings for the same purpose, or for the extraction of fragments of broken or exfoliated bone, will very frequently be found necessary, and must be executed. In the doing this, care must be taken, that what is requisite be done, and no more; and that such requisite operations be performed with as little disturbance and pain as possible; the manner of doing business of this kind, will make a very material difference in the sufferings of the patient.

"Very contrary, or at least very different intentions, seem to me to require the surgeon's very particular attention in the two parts of this stage of the disease.

"Previous to large suppuration, or considerable collections and lodgments of matter, tumefaction, induration, and high inflammation, attended with pain, irritation, and fever, require evacuation by phlebotomy, an open belly, and antiphlogistic remedies, as well as the free use of anodynes, and such applications to the limb as may most serve the purpose of relaxation. But the matter having been formed and let out, and the pain, fever, &c. which were symptomatic thereof, having disappeared, or ceased, the use and purpose of such medicines and such applications cease also, and they ought therefore to be discontinued. By evacuation, &c. the patient's strength has necessarily (and indeed properly) been reduced; by cataplasm, &c. the parts have been so relaxed as to procure an abatement or cessation of inflammation, a subsidence of tumefaction, and the establishment of a free suppuration; but these ends once fairly and fully answered, another intention arises, which regards the safety and well-doing of the patient, nearly, if not full as much as the former; which intention will be necessarily frustrated by pursuing the method hitherto followed. The patient now will require refection and support, as much as he before stood in need of reduction; and the limb, whose indurated and inflamed state hitherto required the emollient and relaxing poultice, will now be hurt by such kind of application, and stand in need of such as are endued with contrary qualities, or, at least, such as shall not continue to relax. Good light, easily digested nutriment, and the Peruvian bark, will best answer the purpose of internals; the discontinuation of the cataplasms, and the application of medicines of the corroborating kind, are as necessary with regard to externals†.

"In short, if there be any rationale in the use of the cataplasm in the first stage, its impropriety in the second, must be evident from the same principles. So also with regard to evacuation and the antiphlogistic regimen, when all the good proposed to be obtained by them has been received, a pursuit of the same method must become injurious, and that for the same reason why it was before necessary and beneficial.

"A non-attention to this has, I believe, been not infrequently the cause of the loss both of limbs and lives.

"Every body who is acquainted with surgery knows, that in the case of bad compound fracture, attended with large suppuration, it sometimes happens, even under the best and most judicious treatment, that the discharge becomes too great for the patient to sustain; and that, after all the fatigue, pain, and discipline, which he has undergone, it becomes necessary to compound for life by the loss of the limb.‡ This, I say, does sometimes happen under the best and most rational treatment; but I am convinced that it also is now and then the consequence of pursuing the re-

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* "It is a practice with some, from a timidity in using a knife, to make use of bolsters and plaster-compresses for the discharge of lodging-matter. Where another, or a counter-opening can conveniently and safely be made, it is always preferable, the compress sometimes acting diametrically opposite to the intention with which it is applied, and contributing to the lodgment by confining the matter; beside which, it requires a greater degree of pressure to make it efficacious, than a limb in such circumstances generally can bear."

† "It is surprising how large and how disagreeable a discharge will be made for a considerable length of time, in some instances, from the detention and irritation of a splinter of bone. If therefore such discharge be made, and there be neither sinus nor lodgment to account for it, and all other circumstances are favourable, examination should always be made, in order to know whether such cause does not exist, and if it does, it must be gently and carefully removed."

‡ "There is one circumstance relative to compound fractures, which perhaps may be deemed worth noticing; which is, that I do not remember ever to have seen it necessary to amputate a limb for a compound fracture, on account of the too great discharge, in which the fracture had been united. In all those cases, where the operation has been found necessary on account of the drain, the fracture has always been perfectly loose and disunited." (*Pott.*)

ducing, the antiphlogistic, and the relaxing plan too far. I would therefore take the liberty seriously to advise the young practitioner, to attend diligently to his patient's pulse and general state, as well as to that of his fractured limb and wound; and when he finds all febrile complaint at an end, and all inflammatory tumour and hardness gone, and his patient is rather languid than feverish, that his pulse is rather weak and low than hard and full, that his appetite begins to fail, and that he is inclined to sweat, or purge, without assignable cause, and this in consequence of a large discharge of matter from a limb which has suffered great inflammation, but which is now become rather soft and flabby, than hard and tumid; that he will in such circumstances set about the support of his patient, and the strengthening of the diseased limb *totis viribus;* in which I am from experience satisfied, he may often be successful, where it may not be generally expected that he would. At least, he will have the satisfaction of having made a rational attempt; and if he is obliged at last to have recourse to amputation, he will perform it, and his patient will submit to it, with less reluctance, than if no such trial had been made.

"I have said, that a compound fracture either unites and heals, as it were, by the first intention, which is the case of some of the lucky few, (and was my own*; or it is attended with high inflammation, multiplied abscesses, and large suppuration, demanding all a surgeon's attention and skill, and even then sometimes ending in the loss of limb, or life, or both; or, that all our attempts prove fruitless from the first, and gangrene and mortification are the inevitable consequence of the accident.

"The two first I have already spoken to, the last only remains.

"Gangrene and mortification are sometimes the inevitable consequences of the mischief done to the limb at the time that the bone is broken; or they are the consequences of the laceration of parts made by the mere protrusion of the said bone.

"They are also sometimes the effect of improper or negligent treatment; of great violence used in making extension; of irritation of the wounded parts, by poking after, or in removing fragments or splinters of bone; of painful dressings; of improper disposition of the limb, and of the neglect of phlebotomy, anodynes, evacuation, &c. Any, or all these, are capable either of inducing such a state of inflammation as shall end in a gangrene, or of permitting the inflammation, necessarily attendant upon such accident, to terminate in the same event.

"When such accident, or such disease, is the mere consequence of the injury done to the limb, either at the time of, or by the fracture, it generally makes its appearance very early; in which case also, its progress is generally too rapid for art to check. For these reasons, when the mischief seems to be of such nature as that gangrene and mortification are most likely to ensue, no time can be spared, and the impending mischief must either be submitted to or prevented by early amputation. I have already said, that a very few hours make all the difference between probable safety and destruction. If we wait till the disease has taken possession of the limb, even in the smallest degree, the operation will serve no purpose, but that of accelerating the patient's death. If we wait for an apparent alteration in the part, we shall have waited until all opportunity of being really serviceable is past. The disease takes possession of the cellular membrane surrounding the large blood-vessels and nerves, some time before it makes any appearance in the integuments; and will always be found to extend much higher in the former part, than its appearance in the latter seems to indicate. I have more than once seen the experiment made of amputating, after a gangrene has been begun, but I never saw it succeed; it has always hastened the patient's destruction.

"As far therefore as my experience will enable me to judge, or as I may from thence be permitted to dictate, I would advise that such attempt should never be made; but, the first opportunity having been neglected, or not embraced, all the power of the chirurgic art is to be employed in assisting nature to separate the diseased part from the sound; an attempt which now and then, under particular circumstances, has proved successful, but which is so rarely so, as not to be much depended upon.

"If the parts are so bruised and torn, that the circulation through them is rendered impracticable, or if the gangrene is the immediate effect of such mischief, the consequence of omitting amputation, and of attempting to save the limb is, as I have already observed, most frequently very early destruction: but, if the gangrenous mischief be not merely and immediately the effect of the wounded state of the parts, but of high inflammation, badness of general habit, improper disposition of the limb, &c. it is sometimes in our power so to alleviate, correct, and alter these causes, as to obtain a truce with the disease, and a separation of the unsound parts from the sound. The means where-

* Mr. Pott suffered a compound fracture of his own leg.

by to accomplish this end must, in the nature of things, be varied according to the producing causes or circumstances: the sanguine and bilious must be lowered and emptied; the weak and debilitated must be assisted by such medicines as will add force to the *vis vitæ*; and errors in the treatment of the wound or fracture must be corrected; but it is evident to common sense, that for these there is no possibility of prescribing any other than very general rules indeed. The nature and circumstances of each individual case must determine the practitioner's conduct.

"In general, inflammation will require phlebotomy and an open belly, together with the neutral antiphlogistic medicines; pain and irritation will stand in need of anodynes, and the Peruvian bark, joined in some cases, and at some times, with those of the cooling kind, at others with the cordial, will be found necessary and useful. So also tension and induration will point out the use of fomentation and warm relaxing cataplasms, and the most soft and lenient treatment and dressing. But there are two parts of the treatment of this kind of case mentioned by the generality of writers, which I cannot think of as they seem to have done. One is, the use of stimulating antiseptic applications to the wound; the other is, what is commonly called scarification of the limb. [Let it be remarked, that I speak of both these, as prescribed and practised while the gangrene is forming, as it were, and the parts are by no means mortified.] While the inflammatory tension subsists, alleviation of pain, and relaxation of the wounded and swollen parts, in order to obtain a suppuration, and consequently a separation, seem to constitute the intention, which ought to be pursued upon the most rational principles: warm irritating tinctures of myrrh, aloes, and euphorbium; mixtures of tinct. myrrh. with mel. Ægyptiac. and such kind of medicines, which are found to be frequently ordered, and indeed are frequently used, particularly in compound fractures produced by gun-shot, seem to me to be very opposite to such intention, and very little likely to produce or to contribute to the one thing which ought to be aimed at, I mean the establishment of a kindly suppuration. I know what is said, in answer to this, viz. that such kind of stimulus assists nature in throwing off the diseased parts; but this is a kind of language, which I believe will be found upon examination to have been first used without any sufficient or good ground, and to have been echoed ever since upon trust. It had its foundation in the opinion that gun-shot wounds were poisonous, and that the mortification in them was the effect of fire; and it has been continued ever since, to the great detriment of many a sufferer. A gun-shot wound, whether with or without fracture, is a wound accompanied with the highest degree of contusion, and with some degree of laceration; and every greatly contused and lacerated wound requires the same kind of treatment which a gun-shot wound does, as far as regards the soft parts. The intention in both ought to be to appease pain, irritation, and inflammation; to relax the indurated, and to unload the swollen parts; and by such means to procure a kindly suppuration; the consequence of which must be, a separation of the diseased parts from the sound. Now, whether this is likely to be best and soonest accomplished by such dressings and such applications as heat and stimulate, and render the parts to which they are applied crisp and rigid, may fairly be left to common sense to determine.

"Scarification, in the manner, and at the time, in which it is generally ordered and performed, has never appeared to me to have served any one good purpose. When the parts are really mortified, incisions made of sufficient depth will give discharge to a quantity of acrid and offensive ichor; will let out the confined air, which is the effect of putrefaction; and thereby will contribute to unloading the whole limb; and they will also make way for the application of proper dressings. But while a gangrene is impending, that is, while the parts are in the highest state of inflammation, what the benefit can be which is supposed or expected to proceed from scratching the surface of the skin with a lancet, I never could imagine; nor, though I have often seen it practised, do I remember ever to have seen any real benefit from it. If the skin be still sound, and of quick sensation, the scratching it in this superficial manner is painful, and adds to the inflamed state of it; if it be not sound, but quite altered, such superficial incision can do no possible service; both the sanies and the imprisoned air, are beneath the membrana adiposa; and merely scratching the skin in the superficial manner, in which it is generally done, will not reach to, or discharge either.

"From what has been said, it will appear, that there are three points of time, or three stages, of a bad compound fracture, in which amputation of the limb may be necessary and right; and these three points of time are so limited, that a good deal of the hazard or safety of the operation depends on the observance or non-observance of them.

"The first is immediately after the accident, before inflammation has taken possession of the parts. If this opportunity be neglected or not embraced, the con-

sequence is either a gangrene or a large suppuration, with formation and lodgment of matter. If the former of these be the case, the operation ought never to be thought of, till there is a perfect and absolute separation of the mortified parts. If the latter, no man can possibly propose the removal of a limb, until it be found, by sufficient trial, that there is no prospect of obtaining a cure without; and that, by not performing the operation, the patient's strength and life will be exhausted by the discharge. When this becomes the hazard, the sooner amputation is performed the better. In the first instance, the operation ought to take place before inflammatory mischief is incurred; in the second, we are to wait for a kind of crisis of such inflammation; in the third, the proportional strength and state of the patient, compared with the discharge and state of the fracture, must form our determination." (*Pott's Remarks on Fractures.*)

PARTICULAR FRACTURES.

Fractures of the Ossa Nasi.

These bones, from their situation, are much exposed to fractures. The fragments are sometimes not deranged; but, most frequently, they are depressed. In order to replace them, the surgeon must pass a female catheter, a ring-handled forceps, or any such instrument, into the nostrils, and, using it as a lever, push the fragments outwards; while, with the index-finger of the left hand, he prevents them from being pushed out too far. When the fragments are inclined to fall inwards again, authors advise supporting them with an elastic gum cannula, or lint, introduced into the nostril.

Fractures of the ossa nasi are sometimes attended with very dangerous symptoms; which may depend, either on the concussion of the brain, produced by the blow, which caused the fracture; or, on the cribriform lamella and the crista galli of the os ethmoides being driven inward, so as to injure and compress the brain.

When the symptoms of pressure on this viscus exist, (see *Head, Injuries of*) and the ossa nasi are much depressed, the surgeon must immediately raise them, together with the perpendicular process of the os ethmoides, which is connected with the cribriform lamella and crista galli. Perhaps, a pair of closed common forceps introduced into the nostrils, might best enable the surgeon to do what is necessary. In all cases, in which the ossa nasi are broken, bleeding and the antiphlogistic treatment are proper; for the vicinity of the eye renders it very liable afterwards to become inflamed; and when there are symptoms of the brain being also injured, the necessity of such practice is still more strongly indicated.

Fractures of the Lower Jaw.

This bone is sometimes fractured near the chin; but, seldom so as to produce a division of the symphysis of that part, though this is not impossible. In other instances, the fractures occur near the angles of the jaw. The bone may also be broken in two places at the same time; in which event, the middle portion is extremely difficult to keep right, because many of the muscles, which draw the lower jaw downwards, are attached to that part.

The condyles and coronoid processes are also sometimes broken; the former the most frequently.

Fractures of the lower jaw may be either perpendicular to its basis, oblique, or longitudinal: of this latter, examples have been known, in which a portion of the alveolar part, with the teeth in it, was detached from the rest of the bone.

In the present cases, the soft parts are commonly contused and wounded. J. L. Petit mentions a case, in which the bone was broken, and the coronoid process quite denuded, by the kick of a horse.

Fractures of the lower jaw are deranged in the following way. When the fracture is near the symphysis, the side on which the processus innominatus is situated, is drawn downward and backward by the sub-maxillary muscles, while the other fragment is supported by the muscles which close the jaw. When the fracture is more backward, the derangement occurs in the same way, but not so easily. When the bone is fractured in two places, the middle portion is always pulled downward and backward by the muscles attached to the chin, while the two lateral pieces are kept up by the levator muscles. When the ramus of the jaw is broken, the masseter, being attached to both pieces, prevents much derangement. When the neck of the condyle is fractured, the pterygoideus externus may pull the condyle forward.

When a blow is received on the lower jaw, or the bone is injured by a fall, or by the pressure of some heavy body; when an acute pain is experienced in the part, and an inequality may be felt at the basis of the bone; when some of the teeth, corresponding to that inequality, are lower than the others; and when a crepitus is perceptible on moving the two pieces of the jaw on each other; there can be no doubt of a fracture. When the gums are lacerated, or the bone denuded by a wound, the case is (if possible) still more manifest.

Fractures of the rami and condyles, though not so easy distinguishable, may

be known by the great pain felt near the ear; particularly when the jaw is moved, and the crepitus, which the surgeon may discover with his finger.

Fractures of the lower jaw, whether simple, or double, are easily set, by pushing the deranged part upward, and a little forward, and then pressing on the basis of the bone, so as to bring it exactly on a level with the portion, which has preserved its natural position. The maintenance of the reduction, however, is difficult; and can only be well executed by supporting the lower jaw, and keeping it applied to the upper one.

As soon as the fracture is set, the surgeon should adapt some thick pasteboard, previously wet and softened with vinegar, to the outside of the jaw, both along its side and under its basis. Over this moistened pasteboard, a bandage with four tails is to be applied, the centre being placed on the patient's chin, while the two posterior tails are to be pinned to the front part of a nightcap, and the two anterior ones fastened to a part of the same cap more backward. When the pasteboard becomes dry, it forms the most convenient apparatus imaginable for incasing and supporting the fracture. A piece of soap-plaster may now be applied to the skin underneath, which will prevent any ill effects of the hardness and pressure of the pasteboard.

Until the bone has become united with some firmness, the patient should be allowed only such food as does not require being masticated, which may be given by introducing a small spoon between the teeth a little separated. Indeed, he should be recommended to live principally on broths, soups, jellies, &c.

To keep the middle portion of the bone from being drawn downward, and backward, toward the larynx, it is frequently necessary to apply tolerably thick compresses just under and behind the chin; which are to be well supported by the bandages already described.

I need hardly state the necessity of enjoining the patient to avoid talking, or moving the jaw in any manner whatever.

When the condyle is fractured, as it is incessantly drawn forward by the action of the pterygoideus externus; and, on account of its deep situation, cannot be pressed back, the lower portion must, if possible, be pushed into contact with it. For this purpose, the bandage must be made to operate particularly on the angle of the jaw, where a thick compress should be placed.

Compound fractures of the lower jaw, are to be treated on the same principles, as such injuries of other bones. The external wound should, if possible, be healed by the first intention; and, when this attempt fails, care must be taken to keep the wound clean by changing the dressings about once in three days: oftener would disturb the fracture too much. It is observed, that compound fractures of the jaw, and even simple ones, which are followed by abscesses, are particularly liable to be followed by troublesome and tedious exfoliations.

In very bad fractures, in which all motion of the jaw must have the most pernicious effect, it might even be prudent to administer every kind of nourishment in a fluid form, through a hollow bougie, introduced from one of the nostrils down the œsophagus.

Fractures of the Vertebræ.

The shortness and thickness of these bones do not render them very apt to be broken. The spinous processes, which project backwards, are the most exposed to such an injury; for they are the weakest and most superficially situated. The violence, which is great enough to break the vertebræ, must produce a greater, or less concussion, or other mischief, of the spinal marrow; from which accident much more perilous consequences are to be apprehended, than from the injury of the bones, abstractedly considered. The displaced pieces of bone may press on the spinal marrow, or even wound it, so as to occasion a paralytic affection of all the parts, which derive their nerves from the continuation of this substance below the fracture.

As the mere concussion of the spine may occasion symptoms, which very much resemble those, which usually occur, when the vertebræ are fractured, the diagnosis is certainly very obscure. Perhaps, an inequality in the line of the spinous processes might be observed. The lower extremities, and the rectum, and bladder, are generally paralytic; the patient is afflicted with retention of urine and feces, or with an involuntary discharge of the latter. (*Boyer.*)

Fractures of the spinous processes, without any other serious mischief, are not dangerous; and are the only instances of fractures of the vertebræ, which admit of being ascertained with certainty.

Any attempt to set fractures of the bodies of the vertebræ, even were they known to exist, would be both useless and dangerous. General treatment can alone be employed. Cupping will tend to prevent inflammation in the situation of the injury. When the patient is affected with a flatulent distention of the abdomen, vomiting, hiccough, &c. the belly may be rubbed with a camphorated liniment, and purgative clysters, and anti-spasmodics, given. If requisite, the urine must be drawn off with

a catheter. The removal of the paralysis of the bladder, rectum, and lower extremities, if it should be inclined to take place, ought to be promoted by rubbing the back, loins, sacrum, and the limbs, with liniments containing the tinct. canthar. (*Boyer.*)

Some authors recommend trepanning, or cutting out a portion of the fractured bone, when the compression of the spinal marrow, or its injury by a splinter, is suspected; but, exclusively of the difficulty of that operation, on account of the great depth of the intervening soft parts, the indication is never sufficiently evident to authorize it. (*Boyer.*)

A fracture of the upper cervical vertebræ, or of the processus dentatus, is always suddenly fatal. In such cases, the paralysis of the diaphragm, immediately produced, affords ample cause for instantaneous death.

Fractures of the Sternum.

When these accidents occur, the fractured portions may be driven inward so as to wound the pericardium, heart, or lungs; and a considerable quantity of blood may be extravasated from ruptured vessels, and collect in the anterior mediastinum. Such an effusion, however, does not cause symptoms so urgent as those, which blood extravasated beneath the cranium produces.

The symptoms of a fracture of the sternum are, inequalities of the bone; a depression, or elevation of the broken pieces; a crepitus and an unusual moveableness of the injured part in respiration; the breathing is frequently difficult, and almost always accompanied with a cough, spitting of blood, palpitations, and inability to lie on the back. According to the observations of Petit and Baldinger, several of these latter symptoms may continue with less intensity, a long while after the fracture is cured. See *Levéillé's Nouvelle Doctrine Chirurgicale, Tom.* 2. *p.* 243.

Fractures of the sternum, when mere solutions of continuity, only require common treatment; viz. a piece of soap-plaster to the situation of the injury, a roller round the chest, quietude, and, in particular, bleeding, with a view of preventing, what may be considered as the most dangerous consequence, inflammation of the parts within the chest.

In cases, attended with great depression of the fractured bone inward, the necessary incisions should be made, in order to raise with an elevator the portions of the bone driven inward, or extract with forceps any loose splinters, which seem to be similary circumstanced. It is not often necessary to trephine the sternum, either to raise a depressed portion, or to give vent to extravasated fluid. Such an operation, however, may occasionally be proper, either in the examples specified, or when the bone becomes carious, and the diseased part is exceedingly tedious in separating.

Fractures of the sternum are more frequently produced by gun-shot violence, than any other cause, and, in these cases, there will generally be many splinters, which will require extraction. At the battle of Marengo, the French general Champeux received such a wound, with which he lived nearly a month: the injury was attended with so many splinters, that, when they were removed, the pulsations of the heart, were visible to a considerable extent. (*Levéillé op. cit. Tom.* 2, *p.* 244.)

The ensiform cartilage when ossified in old subjects, is liable to be fractured. Little more, however, can be done in such a case, than relaxing the abdominal muscles by raising the thorax and pelvis, and then applying a piece of soap-plaster and a roller over the part, for the purpose of keeping it steady. When the blow has been violent, the patient should always be bled.

Fractures of the Ribs.

These generally happen near the greatest convexity of the bones, several of which are often broken together. The first rib, being protected by the clavicle, and the lower ones being very flexible, are less liable to be fractured, than the middle ones.

When a spicula of a fractured rib is beaten inward, it may lacerate the pleura, wound the lungs, and cause the dangerous train of symptoms attendant on emphysema. (See *Emphysema.*)

A pointed extremity of the rib, projecting inwards, may also cause an extravasation of blood; or, by its irritation, produce inflammation in the chest. A fracture, which is not at all displaced, is very difficult to detect, particularly in fat subjects; and, no doubt, is very frequently never discovered. The surgeon should place his hand on the part, where the patient seems to experience a pricking pain in the motions of respiration, or where the violence has been applied. The patient should then be requested to cough, in which action the ribs must necessarily undergo a sudden motion, by which a crepitus will often be rendered perceptible. All the best practitioners, however, are in the habit of adopting the same treatment, when there is reason to suspect a rib to be fractured, as if this were actually known to be the case, by the occurrence of a crepitus, or the projection of one end of the fracture; which, indeed, in instances, which are displaced,

makes the nature of the accident sufficiently plain.

A broken rib cannot be deranged either in the direction of the diameter of the bone, nor in that of its length. The ribs, being fixed posteriorly to the spine, and anteriorly to the sternum, cannot become shortened. Nor can one of the broken pieces become higher, or lower, than the other, because the same muscles are attached to both fragments, and keep them at the same distance from the neighbouring ribs. The only possible derangement is either outward, or inward. (*Boyer.*)

Simple fractures of the ribs, free from urgent symptoms, require very simple treatment. The grand object is to keep the broken bones as motionless as possible. For this purpose, after applying a piece of soap-plaster to the side, and over it proper compresses; a broad linen roller is to be firmly put round the chest, so as to impede the motion of the ribs; and compel the patient to perform respiration chiefly by the descent and elevation of the diaphragm. A scapulary will prevent the bandage slipping downwards. When the fractured part seems depressed inward, the compresses should be placed on the anterior and posterior part of the bone. As a roller is very apt to become slack, many surgeons, with good reason, never employ one in the present case; but take a piece of strong linen, large enough to surround the chest, and lace it with packthread, so as to compress the ribs in the necessary manner.

When there is reason from the symptoms to think the lungs injured, or disposed to inflame, copious and repeated bleedings should be practised. Indeed, as peripneumony is always apt to succeed the accident, and is a most dangerous occurrence, every person free from debility, either having a broken rib, or supposed to have such, should always be bled in the very first instance. The spermaceti mixture, with opium, is an excellent medicine for appeasing any cough, which may disturb the fracture, and give the patient infinite pain.

Fractures of the Sacrum.

These accidents do not often occur; and, when they do, must be occasioned by some powerful cause, such as the fall of a very heavy body, or the passage of a carriage wheel on the convex side of the bone, or a fall from a great height on that part. No muscle tends to derange the position of the broken portions. Indeed, the principal danger depends on the injury, which the pelvic viscera may have suffered from the violence which broke the bone. To prevent the inflammation of such parts, of course, antiphlogistic means, particularly bleeding, are highly proper. Another source of grievous complaints, occasionally arising from fractures of the sacrum, is the injury done to the sacral nerves. Hence often proceed, retention of urine, inability to retain this fluid, involuntary discharge of the feces, paralysis of the lower extremities, &c.

With respect to the relief of these symptoms, we need add nothing to what we have already said on the subject, in speaking of fractured vertebræ. The reader must also refer to the articles, *Urine, Retention of; Incontinence of*, &c. Should the lower portion of the sacrum be displaced inward by the force applied, it is to be reduced in the same way as the os coccygis. With regard to the particular means for promoting the union of the fractured sacrum, all that can be done is to apply a piece of the emplastrum saponis to the part, and put a roller round the pelvis, or a T bandage.

Fractures of the Os Coccygis,

Though much slighter than the sacrum, it is less frequently broken. Its not being much exposed to external force, and its moveableness, are the reasons of this. When the os coccygis is fractured by a fall on the buttock, the pain, arising from the accident, is increased by walking, in consequence of some fibres of the glutei being attached to this bone, and disturbing it when in action. (*Boyer.*)

When the detached piece of bone is driven inward, the surgeon is to introduce his fore-finger, previously oiled, into the rectum, and, with the assistance of the fingers of his other hand externally, he is to reduce the displaced part. This being accomplished, little more can be done, than applying a piece of soap-plaster to the injured part, together with a T bandage; adopting the antiphlogistic regimen, and enjoining the patient to avoid lying on his back, or sitting down. He should also avoid walking, so as to put the glutei muscles into action, which would disturb the broken bone.

Fractures of the Ossa Innominata.

Such cases are not common; and, when they happen, are generally produced by the passage of heavy carriage wheels, over the pelvis; and are always attended with considerable contusion of the external soft parts, and sometimes with great injury of the pelvic viscera. The anterior superior spinous process has been broken off, by the kick of a horse. (*Boyer.*)

In St. Bartholomew's hospital, several instances occurred, during my apprenticeship to Mr. Ramsden, in which the os ilium, os ischium, and os pubis, were found fractured on opening the bodies

after death; and, when we consider the great violence necessary to produce such accidents, we cannot wonder that the injured state of the pelvic viscera should frequently prove fatal. The fractures themselves are seldom displaced, so that what relates to their treatment is exceedingly simple, merely consisting in applying a roller round the pelvis, and putting a piece of soap-plaster on the broken part. The grand indication is to obviate the consequences of inflammation of the parts within the pelvis, and even of the peritonæum and abdominal viscera, by copious and repeated blood-letting. Any complaints respecting the evacuation of the urine and feces, must also be attended to. When the contusion is excessive, and the bones very badly broken, the patient cannot move nor go to stool, without suffering the most excruciating pain. To afford some assistance in such circumstances, Boyer, in a particular case, passed a piece of strong girth web under the pelvis, and, collecting the corners into one, fastened them to a pulley suspended from the top of the bed. This enabled the patient to raise himself with very little effort, so that a flat vessel might be placed under him. Certainly, a bed on the principles recommended by Sir James Earle, might be of infinite service, both in these cases, as well as in many others, particularly compound fractures and paralytic affections from diseased vertebræ. (See *Observations on Fractures of the Lower Limbs; to which is added, an account of a contrivance to administer cleanliness and comfort to the bed-ridden; by Sir J. Earle*, 1807.

Sometimes, notwithstanding the rigorous adoption of antiphlogistic measures, abscesses cannot be prevented from forming in the pelvis; particularly, when there are detached splinters driven inwards. Such splinters may wound the bladder, and cause an extravasation of urine. Desault extracted a splinter, which had done so, from the bottom of a wound, which he had made to give exit to the effused urine. In these cases, a catheter should be kept introduced to prevent the urine from collecting in the bladder, and afterwards insinuating itself into the cavity of the abdomen. (*Chopart.*)

Fractures of the Thigh.

To this subject I shall allot as much room as the work will possibly afford, because it is one, which strongly claims the consideration of modern surgeons, and may be deemed even yet unsettled; the illustrious Pott defending one method of treatment; the celebrated Desault another.

The os femoris is liable to be broken at every point, from its condyles to its very head. It is, however, at the middle third of this extent, that fractures mostly occur. The fracture is sometimes transverse, but, more frequently oblique. The latter direction of the injury makes a serious difference in the difficulty of curing the case, without future deformity, or lameness. Sometimes the fracture is comminuted, the bone being broken in more places than one; and sometimes the case is attended with a wound, communicating with the fracture, and making it, what is termed, *compound*. As Petit remarks, however, the thigh-bone is less seldom broken into several pieces, than others more superficially situated.

A fractured thigh is attended with the following symptoms; a local acute pain at the instant of the accident; a sudden inability to move the limb: a preternatural mobility of one portion of the bone; sometimes a very distinct crepitus, when the two ends of the fracture are pressed against each other; deformity, in regard to the length, thickness, and direction, of the limb. The latter change, viz. the deformity, ought to be accurately understood; for, having a continual tendency to recur, especially, in oblique fractures, our chief trouble in the treatment is to prevent it. (*Desault, par Bichat.*)

Almost all fractures of the thigh are attended with deformity. When this is considered, in relation to length, it appears, that, in oblique fractures, the broken limb is always shorter than the opposite one; a circumstance denoting, that the ends of the fracture ride over each other. We may also easily convince ourselves, by examination, that the deformity is owing to the lower end of the fracture having ascended above the upper one, which remains stationary. What power, except the muscles, can communicate to the lower portion of the fractured bone, a motion from below upwards? At one end, attached to the pelvis; and, at the other, to this part of the bone, the patella, the tibia, and fibula, they make the former insertion their fixed point, and drawing upward the leg, the knee, and the lower portion of the thigh, they cause directly, or indirectly, the derangement in question. In producing this effect, the triceps, semitendinosus, semimembranosus, rectus, gracilis, sartorius, &c. are the chief agents.

To shew the power of the muscles to displace the ends of such fractures, mention is made, in Desault's works by Bichat, of a carpenter, who fell from a scaffold, and broke his thigh. The limb, the next day, was as long as the other; but, the man had a complete palsy of his lower extremities, and could not dis-

charge his urine. The moxa was applied, and the muscles soon regained their power, and then the shortening of the limb began to make its appearance.

Besides the action of muscles, there is another cause producing a derangement of the fracture, in the course of the treatment.

How firm soever the bed may be on which the patient is laid, the buttocks, more prominent than the rest of the body, soon form a depression in the bedding, and thence follows an inclination in the plane on which the trunk lies; which, gliding from above downward, pushes before it the upper end of the fracture, and makes it ride over the lower one. The muscles, irritated by the points of bone, increase their contraction, and draw upward the lower part of the bone; and from this double motion of the two ends of the fracture in opposite directions, their riding over each other results. (*Desault, par Bichat.*)

Tranverse fractures are less liable to be displaced in the longitudinal direction of the bone, because, when once in contact, the ends of the fracture form a mutual resistance to each other; the lower one, drawn upward by the muscles, meets with resistance from the upper one, which itself inclined downward by the weight of the trunk, pushes the former before it, and thus both retain their position in relation to each other.

The deformity of a fractured thigh, in the transverse direction, always accompanies that which is longitudinal; but, sometimes, it exists alone. This is the case, when, in a transverse fracture, the two ends of the bone lose their contact; one being carried outward, the other inward; or, one remaining in its place, while the other is separated. The upper end of the fracture is not now, as in the foregoing instance, motionless in regard to the muscular action; the contraction of the pectineus, psoas, iliacus internus, and upper part of the triceps, deranges it from its natural direction, and contributes to displace it.

The deformity of the limb, in regard to its direction, is either the consequence of the blow, which produced the fracture, or, what is more common, of the ill-directed exertions of those who carry the patient. Thus we see that an injudicious posture bends the two portions, so as to make an angle. (*Desault, par Bichat.*)

Whatever may be the kind of deformity, the lower end of the fracture may retain the natural position in which it is placed, or else undergo a rotatory motion on its axis outward, which is very common, or inward, which is more unusual. This rotation always aggravates the displaced state of the fracture, and should be attended to in the reduction. (*Desault, par Bichat.*)

Having presented the reader with these accurate remarks on the kinds of derangement, to which fractured thighs are subject, I shall beg his attention to a few observations of my own, on Mr. Pott's account of the effects of posture on fractured limbs; on what constitutes the chief displacement of a broken thigh, and what muscles can principally produce this effect; and, lastly, on the actual condition of such muscles in the bent position of the limb.

1. Almost every one initiated in the surgical profession, imbibes a vague kind of information, that relaxation of the muscles, both in the reduction, and during the whole cure of fractures, was what Mr. Pott most strenuously recommended as the proper condition, in which those powers ought to be placed, under such circumstances; and was what he had in view in adopting the bent position for a fractured thigh.

The love of truth, leads me, however, to remark, that this eminent surgeon has not availed himself of the light, resulting from anatomical enquiries, to elucidate the effects of posture upon fractured limbs. Though many practitioners may now feel persuaded, how much greater the advantages are in the bent, than in the straight posture of the limb, in the case of a broken thigh; yet, few are so well acquainted with the exact reasons why, and precise manner, how those advantages arise. It is true, as already stated, it is known in a vague manner, that the advantages alluded to, arise from the relaxation of muscles connected with the fractured bone; Mr. Pott contents himself with making mere assertions to this effect, and supporting them upon an appeal to experience, leaves the rationale of the subject in perfect obscurity. When we have practical evidence in favour of any adoption, and when, at the same time, no rational theory can be formed to coincide with it, certainly, it behoves us to follow the more useful dictates of the former, and to beware of any dangerous hypothesis into which too eager a pursuit of the latter might allure us. When numerous surgeons, however, are in a state of indetermination, nay, what is more urgent, when one half of the profession seems to be at variance with the other upon a point important to be decided, and without the prospect of approaching harmony of practice, what resource remains, but that of reason, to instil into the mind those facts and principles, by which all must be governed; and, from a

due observation of which, only one opinion and practice would result? To rest contented with barely knowing, that the superior utility of the bent posture, in the case of a broken thigh, proceeds from the relaxation of muscles, is to remain in a certain state of ignorance, from which, by an unfettered exercise of our own intellects, we might possibly disengage ourselves. Nor will any man of reflection contend that information so naked, so void of illustration, is enough to saturate with full conviction that philosophical spirit of enquiry, from which the present enlightened state of medical science is so eminently derived. And might it not tend to advance, and very usefully to improve our knowledge of the subject, if we could ascertain more accurately upon what principle the posture of the limb ought to be selected with the greatest possible advantage to the patient? Until that is accomplished, we are acting as mere surgical automatons; without true science, and without a ray of judgment. Neither will it be satisfactory to answer, that posture is to be determined upon the principle of relaxing the majority of the muscles connected with the broken bone. More is essentially required to make the solution in this way accurate; for, even admitting, what some may be inclined to doubt, that the bent position does relax more muscles than the straight one, its precision will vanish, when we shall have explained, that certain muscles, moving the thigh-bone, possess much greater power to impede the favourable coaptation and union of the fracture, than others performing the same office, and of not inferior bulk. I am humbly of opinion, that those practitioners, who still adhere to the old plan of placing fractured thighs in the straight posture, have never been struck with this distinction; and, in contending that their mode of treatment relaxes as many muscles connected with the broken bone as the opposite one, they have not reflected upon what constitutes the relative displacement of the two ends of the fracture. I have heard it more than once remarked, that what Mr. Pott terms the relaxed position of the limb, cannot really merit that application, because there are, perhaps, as many muscles thrown into a state of tension into this very posture, as in the straight one. According to my ideas, there is some reason in this criticism; but no one must thence infer, that the straight position is equally proper; for, provided we shall be able to make out the truth of what has been delivered above, the question under consideration will be much altered; and, instead of inquiring, "Are more muscles relaxed in the bent, than in the straight position?" we must enquire, "Are more of those muscles, *possessing most influence over the fracture*, relaxed in this or that position of the limb?"

Were we to resign the privilege of thinking for ourselves, and implicitly to mould our opinions, according to any authority, however high, we should often fall into very avoidable errors. Were we to believe the literal sense of several passages in Mr. Pott's remarks upon Fractures, we should suppose it possible and practicable to relax at once, by a certain posture of the limb, every muscle connected with a fractured bone. In the first vol. of his works, page 389, edit. 1783, he observes, in speaking of what must best answer the purpose of incapacitating the muscles from displacing the fracture: "Is it not obvious, that putting the limb into such position as shall relax the whole set of muscles, belonging to, or in connexion with, the broken bone, must best answer such purpose?" and, in the next page, "What is the reason why no man, however superficially acquainted with his art, ever finds much trouble in setting a fractured os humeri; is it not both because patient and surgeon concur in putting the arm into a state of flexion, that is, into such a state as relaxes all the muscles surrounding the broken bone?" Also in page 393, he continues, "Change of posture must be the remedy, or rather the placing the limb in such manner as to relax all its muscles." That to have all the muscles relaxed in cases of fracture would be desirable, were it also practicable, every one will admit; but the possibility of accomplishing it, so long as different muscles have different uses, different situations, and different attachments to the bones, every one must grant to be no more than visionary. For instance, do not the patient and surgeon, in the case of fractured os humeri, adverted to above, rather concur in putting the fibres of the triceps and anconeus into a state of tension, at the same moment that they relax the biceps and brachialis internus?

In short, the indetermination of many practitioners, with regard to the greater propriety of placing a fractured thigh-bone in the bent, than in the straight position, must, in a great measure, be attributed to the imperfect explanations, hitherto offered of the way, in which the former becomes more advantageous than the latter; especially, if it be true, that a comparative and fair trial in practice would shew, that the bent posture is in no respect inferior to the straight one, and will even succeed in many instances, where deformity, shortening of the limb, and lameness, would be inevitable consequences of the other.

2. By what I am now going to remark,

I do not mean to question the accuracy of Desault's account of the various kinds of derangement to which a broken thigh is liable. The rising end of the bone has now been put into its proper point of view, and even ordinary practitioners are well aware of the erroneous ideas once entertained concerning it, and the more pernicious treatment often had recourse to in consequence. In the fractured thigh, the rising end of the bone is the upper extremity of the fracture, that which is connected with the hip, that which is truly in its right and natural situation, and that which no surgical means can therefore possibly alter for the better. On the other hand, the lower end of the fracture, or that which is connected with the knee, is that which is displaced, that which is drawn more or less underneath the other extremity of the bone, and that which well-directed surgery can generally set right again.

No doubt can, I think, exist about the accuracy of these preceding propositions, when we consider, that the superior portion of the broken bone is properly articulated with the acetabulum; that its broken extremity is neither removed farther from, nor nearer to, that cavity than nature placed it; that the position, in which the upper portion of the broken os femoris is found, is not in the least deranged, and precisely such as it has oftentimes been put into previously to the occurrence of the accident. But, the lower end of the fracture is not only wrong in relation to the upper end, it is out of its due situation in all other respects; it is drawn upward nearer to the pelvis than it ever could be naturally, and hence the limb is shortened; the position, in which it is constantly found, is so deranged, in relation to the pelvis, its axis is so altered, that even were we to overleap the bounds of possibility, and to suppose the upper end of the fracture brought into apposition with it so situated, we should at the same time be obliged to construct in our wanton imagination a new acetabulum, differently situated from the natural one for the reception of the head of the bone; or, perhaps, it might best suit such chimera to alter the ordained shape of the thigh-bone. The deviation from the natural and relative situation of the two ends of the fracture, it is then my wish to imply, proceeds, not from any derangement of the upper portion, but, from a retraction of the inferior part of the broken bone.

If it be received as an irrefragable truth, that the upper extremity of the fracture is not out of its due situation, and that the lower end is so, it must necessarily follow from the admission of this principle, that the first grand indication in the management of the case, is to put the lower end of the fracture into its right and relative situation, by drawing it downward, and placing it in as perfect apposition, as the nature of circumstances will allow, and not to make any vain attempts to press down the prominent end of the bone; a thing altogether impracticable and highly improper.

Let us now suppose, that the surgeon proceeds to replace the lower end of the fracture, which we have described as being retracted, more or less, underneath the other.

Mr. Pott has judiciously remarked, that to impede the accomplishment of this purpose, little or no difficulty can arise from the fracture itself, the broken ends of the bone being of themselves inactive. The muscles must be looked upon as those powers, which can, and do make opposition to the reduction of the fracture; and, when set right, to its continuing so. The muscles alone are the powers causing the retraction of the bone and shortening of the limb.

It is well, and universally known, that muscles can only contract to a certain length; and, it is upon a knowledge of this fact, that the principle and utility of relaxing their fibres are founded; for, in proportion as they become relaxed by the approximation of their attachments, they are partly deprived both of their disposition and power to act. What then is implied by relaxation of a muscle is most simple of comprehension; it is that condition, in which its origin and insertion are more or less approximated to each other.

We shall now enquire, what muscles are so circumstanced as to be capable of making most resistance to the reduction and coaptation of the fracture; for, should we succeed in ascertaining them with precision, it must be a primary consideration to relax them, rather than any others, less empowered to do harm; and, after what has been delivered, it seems a most easy matter to determine them.

That those muscles, destined to move the os femoris, and affixed only to part of this bone above the situation of a fracture, cannot make any opposition to its reduction, nor principally disturb the coaptation; and that, therefore, their relaxation is not what the skilful surgeon ought primarily to aim at, appear to my mind two very manifest propositions, arising from the facts already premised.

But, that he ought to aim principally at the relaxation of those muscles which can concur to retract the lower end of the fracture; all which must necessarily have their insertions below the breach of continuity in the bone, appears to me a fact equally obvious; and, is what I think not

unworthy the attentive consideration of all practical surgeons.

My sentiments, however, are not at all repugnant to Desault's description of the derangement; for, I would not take upon me to deny altogether a circumscribed power in muscles attached only to the superior portion of the broken bone to affect the fracture unfavourably, especially, when such fracture is of the transverse kind. It is possible, that they may do so in a limited degree; though, I am inclined to believe, that, in the bent posture, their power of acting injuriously must be so trivial, as to be unworthy of serious notice. The reasons, for my entertaining this opinion, I shall explain.

When a transverse fracture is reduced, and its broken extremities are placed in even apposition with each other, it is possible to conceive, that the first deviation from the proper situation of the two ends of the fracture, may arise from the contraction of some muscle, that has only a power of moving the upper portion of the bone, and that, in consequence of the superior end of the fracture being moved, and its resistance taken away, the inferior end may become more easily retracted. This idea, however plausible it may at first appear, will, upon mature consideration, be found in no degree to militate against the opinion advanced, *that the muscles attached to the lower portion of the broken bone have most influence over the fracture:* and it is at once obvious, that, without the action of these latter muscles, no retraction of the lower end of the fracture could take place, into whatever position the other might be drawn by the contraction of other muscles. I am also of opinion, that most of those fractures of the thigh, which I have seen, have been oblique, and the ample experience of Pott and Desault seems to have made them of a similar sentiment. Whether this remark be true to the extent which I have stated, or not, it must at least be granted, that, in oblique fractures of the thigh, the resistance made by the upper end of the fracture to the retraction of the lower, will not be effectual enough to defeat the continual tendency of the muscles to produce that effect. It seems rational to suppose, that those few instances, where little difficulty is experienced in maintaining the fracture in a proper state of coaptation, and where no retraction happens, are cases of the transverse kind, and, consequently, if in such rarer instances alone, and in such instances as consequently end well, the muscles attached above the fracture can do harm, it is not of so much importance. Besides, admitting (what indeed I have already admitted) that, in transverse fractures of the thigh, the resistance made by the upper end of the fracture to the retraction of the lower, becomes of considerable utility, it is evident, that it becomes so only by counteracting the action of those muscles, which tend to draw upward the inferior portion of the fractured bone. Were it only in our power effectually to incapacitate them by posture, or any other means, oblique fractures of the thigh would be no more difficult to unite favourably, than transverse ones. The majority of cases also being oblique, and these being such as so often baffle the surgical art, we can only rely upon our means of diminishing the power of muscles to retract the inferior portion of the fractured bone for the accomplishment of a good cure.

In the bent position of the limb, let me also enquire, in what direction can the superior end of the fracture be first drawn by the action of muscles? The flexors of the thigh being relaxed, we cannot suppose, that they make it project forward, as it actually does, or at least has done in every instance of displacement that I have yet seen. It may be suggested, that the adductor muscles may do so; but, as these ought also to be perfectly relaxed in the bent position, they cannot, when the bone is set right, and placed as circumstances demand, do what we are considering.

The glutei are tense, and may therefore be conceived capable of disturbing the coaptation; but, to appeal to fact, and the incontestable evidence of experience, do we ever find the upper end of the fracture situated either behind, or on the outside of the lower end? Do we not constantly find it projecting in front, and the latter drawn up more or less behind it? Even supposing the upper end of a transverse fracture were first drawn in a direction backward, would it not rather tend to prevent retraction of the lower end, according to the manner in which it is uniformly found to be displaced? In short, we can account for every thing, relating to the displaced condition of the fracture, without having recourse to the doctrine admitting much influence over the fracture to reside in muscles attached only to the superior portion of the fractured bone. If, at the same time, we concede, for the sake of a reconciliation of opinions, that muscles inserted into the os femoris, above the situation of a fracture, may act in some degree unfavourably to its union, it yet remains a manifest and unshaken truth, that since no posture of the limb will at once relax all its muscles, it is the duty of the surgeon to select that one, which brings with it the greatest share of advantages, and which disarms, as it were, those muscles, endued with most power to disturb the union of the fracture.

What renders the foregoing remarks more deserving attention is, that the majority of fractures of the thigh-bone happen at some point below the attachment of the gluteus maximus, and that the majority of the muscles, inserted directly into the os femoris, have their attachments so high, that they cannot be supposed to possess great influence over fractures situated at any point much below the trochanters. The psoas magnus and iliacus internus, the glutei, and all the rotators of the thigh-bone outward come within this description, together with, the pectinalis, the superior fibres of the adductor magnus, and all the adductor brevis.

What muscles now remain to antagonize so powerfully the endeavours of the surgeon? In this general view of the subject, the greater part of the triceps will be the only power, inserted immediately into the os femoris, possessing considerable influence; yet, there are several other very bulky muscles, concerned in the motions of the knee-joint, which may combine very forcibly to retract the lower end of the fracture, and thus resist the reduction and disturb the coaptation, and union of the bone.

Such are the extensor muscles of the leg, especially, the rectus, as we presently shall explain, and the flexor muscles, sartorius, gracilis, semimembranosus, semitendinosus, and biceps. If these are really the muscles, capable of exerting themselves, with most effect, in producing the difficulties accompanying the treatment of all those fractures of the thigh, which happen below the tendon of the gluteus maximus, it certainly becomes a matter of considerable importance to observe, if possible, their relaxation, rather than that of any other set of muscles, less empowered to do harm.

When the fracture is above this point, other muscles come into power, and hence the difficulties augment.

3. In noticing the condition, into which the above muscles are put in the bent position of the limb, we shall, as occasion requires, mention those circumstances, which diminish, or increase, their influence over the fracture.

The triceps is the principal adductor of the thigh; it may also, from the nature of its attachments, combine to bring the thigh-bone forward, and hence, bending the thigh must in a certain degree contribute to its relaxation. It is probable, that of all the muscles capable of impeding, with the greatest effect, the setting of a broken thigh, the triceps is that, which possesses the highest share of power, considering its vast bulk, and its extensive insertion in the bone. Its perfectly relaxed state cannot, therefore, be too particularly insisted upon; it is not enough, for this purpose, to bend the thigh upon the pelvis; this alone can only produce a very partial relaxation of its fibres.

The patient ought to be placed upon a firm mattress, and, as he lies upon his side with his thigh bent to an acute angle with the trunk, the pelvis is to be turned completely upon its lateral part, and the fractured bone somewhat raised by pillows. Thus the os pubis and os ischium (from which the three heads of the triceps arise) will become approximated to the linea aspera, and the ridge above the internal condyle of the os femoris (into which they are inserted) as much as circumstances will permit, and thus the relaxation of the muscle will be effected.

The pectinalis can only be a primary power in disturbing the fracture, when the accident has occurred very high up. As it is an assistant both in the flexion and adduction of the thigh, it must be relaxed in the above position. I need only observe further respecting it, that the majority of fractures happen below its insertion, and, consequently, in such instances, it will, with the upper fibres of the triceps, possess no power of displacing the lower end of the fracture.

The next muscles, claiming our attention, are the extensors of the leg.

In considering the effect of the action of different muscles upon a fractured thigh-bone, it is useful to carry in our mind the precise direction in which the inferior end of the fracture is displaced. We should bear in our recollection, that it is drawn up more or less behind the upper portion of the bone; and muscles, which can most concur to produce such retraction, are those, which can most impede the favourable union of the fracture. The situation of the extensor muscles of the leg at once suggests to us, that they cannot produce this effect nearly in so great a degree as the flexors. It is true, that the sartorius is situated in front of the thigh, and has been enumerated as possessing much influence over the fracture; but, it is to be remembered that the direction of its force is entirely changed in consequence of its spiral course, and its passing behind the internal condyle of the os femoris. The rectus may undoubtedly aid in the retraction of the lower end of an oblique fracture: its power to disturb a transverse one seems doubtful. Being a loose muscle, not attached to the thigh-bone, and acting only from two points very remote from each other, viz. the anterior inferior spine of the ilium, and the patella, it can on this account exert the strength of every fibre, both above and below the breach of continuity in the bone, in combining to re-

tract the inferior end of an oblique fracture. The vasti and cruralis, on the contrary, being muscles intimately attached to the os femoris, and having no origin whatever from the pelvis, can only employ the force of those fibres, which happen to be situated above the fracture in aiding to retract the lower portion of the broken bone. For instance, supposing the fracture to be situated about the middle of the thigh, all those fibres of the vasti and cruralis deriving their origin from the os femoris below the breach of continuity in the bone, and inserted into the patella, can obviously have no effect in producing the retraction and displacement of the inferior end of the fracture. This fact must considerably lessen the influence of these three extensors in acting injuriously toward fractures. There are yet other circumstances, which must tend to diminish their power. If we reflect upon the lower end of the fracture, when displaced; if we remind ourselves, that it is constantly drawn up behind the other; it must immediately strike us, that the vasti and cruralis, the fibres of which embrace and adhere so intimately to the surface of the bone, both above and below the fracture, must be more or less detached from their origin, in proportion to the degree of retraction and displacement; that the fibres of the vasti, taking their origin from the lower part of the linea aspera above the fracture, must in all probability be detached from such connexion by the retraction of the lower end of the fracture in that situation; and that the fibres of the cruralis must at the same time be partially detached from their intimate connexion with the anterior surface of the bone below the fracture. Such separated fibres can exert no power over fractures. When we also reflect, that the fibres of the cruralis and the anterior ones of the vasti must inevitably be more or less stretched round the upper end of the fracture, by which the direction of their force upon the lower end must be so changed, that, instead of tending to draw it upward, they can only pull it forward, I think it must be granted that their faculty of materially disturbing a fractured thigh is involved in doubt. The rectus is certainly to be considered, in every respect, as one of the primary powers acting in the displacement of fractures, and, as such, it ought to be perfectly relaxed, if other considerations should not forbid it; that is, if we should not throw a larger bulk of muscular fibres, disposed to act unfavourably on the fracture, into a state of tension, by observing its perfect relaxation, than we should, by such means, relax, and according to our principles, this would undoubtedly happen. Consequently, in the bent position of the limb, though we do not completely relax the rectus, since, the knee is bent, at the same time that the thigh is in a state of flexion, yet we must, of necessity, be content with a partial relaxation of its fibres, for the sake of relaxing a more powerful set of muscles next to be considered. It may not however be inapplicable to state, that in the bent position, the anterior inferior spine of the ilium is almost, if not quite, as near to the patella as in the straight one, and of course even the rectus must be equally favoured in point of relaxation. The vasti and cruralis are tense in the bent position; but, I cannot consider their power over the generality of fractures to be of primary importance. The higher the fracture is situated, the less can they exert that little share of influence which they may be supposed to possess; and accidents of this description, when in a high situation, being always the most troublesome, is a circumstance proving, that it is to other powers we ought to attribute the augmentation of difficulty.

The flexor muscles of the leg, above enumerated, are capable of acting very powerfully in resisting the reduction, and disturbing the coaptation of the fracture. For the sake of surveying them more clearly in this surgical point of view, they may be divided into two classes. The first comprehends two muscles arising from the pelvis in front, viz. the gracilis and sartorius, which are favoured in all respects by the bent position of the limb, as well by flexion of the thigh, as by that of the leg; and also in a very important degree by observing to place the pelvis strictly upon its side, and to raise the thigh by proper pillows. The second class consists of three muscles coming from the tuberosity of the ischium behind, viz. the semimembranosus, semitendinosus, and long head of the biceps, being such as are only favoured, with a view to relaxation, by flexion of the knee.

That the sartorius and gracilis are in every respect favoured by the bent posture, no one acquainted with the origins and insertions of those muscles; no one knowing the effect of their action, will feel inclined to deny; and presuming upon the admission of this truth, I shall pass on to reflect upon the state of the three other flexors enumerated above.

In deriving their origin from the tuberosity of the ischium, they acquire a power of contributing to draw the limb backward, as well as of bending the knee. Hence, their perfect relaxation is obviously unaccomplished in the bent position. One might even conjecture *à priori*, that they are little, or not in the least, benefited in such con-

dition, because bending the thigh may seem to counteract all the good effect, in regard to relaxation, resulting from flexion of the knee. Measurements on the skeleton, however, will shew, that the tuberosity of the ischium is approximated considerably more to the heads of the tibia and fibula in the bent, than in the straight posture. I may also take the liberty of remarking, that horizontally situated, as the thigh-bone is in the straight position, it cannot be regarded, as affording an equal degree of relaxation to such muscles, as if it actually were in a state of perfect extension. The short head of the biceps will, in many instances, be enabled to assist in the retraction of the inferior end of the fracture, and it is manifestly relaxed in the bent position. I am not inclined to allow any share of power to reside in the popliteus.

Daily experience justifies my laying it down, as a fact, that the higher the fracture is situated, *cæteris paribus*, the greater is the difficulty experienced in keeping it in a state of apposition. In contemplating the subject, upon the principles advanced in the preceding remarks, we immediately discern the reason of it. When the fracture is very high, almost the whole of the triceps and pectinalis concur to retract the bone. When immediately below the trochanters, the gluteus maximus is to be added to the numerous class of muscles, capable of disturbing the union of the fracture. When in the neck of the bone, the multitude of muscles, inserted into the two trochanters, become enabled to assist in the retraction and displacement of the main portion of the bone. Hence, the immense difficulty to be surmounted in accomplishing the union of such cases, without shortening of the limb, and the foot being distorted outward. In cases of this kind, the short head of the biceps, the vasti, and the cruralis, will, however, have no force over the fracture. When the neck of the os femoris is fractured within the orbicular ligament (which remains entire,) it is clear, that the retraction must be much limited.

I might strengthen the preceding observation, that in proportion as the fracture is high, the greater is the difficulty experienced in maintaining the ends of the fracture in contact, by noticing, that I have seen several cases, in which the os femoris was broken very low indeed, and in which no retraction nor displacement whatever happened. Perhaps, these fractures might have been of the transverse kind, and, perhaps the greater surface for apposition, on account of the expanded form of the bone, at this part, might have had some share in preventing retraction. But, it must appear certain, that, in such instances, several muscles would have lost almost, or entirely, their influence to produce that effect; such as the triceps, pectinalis, &c. and the muscles moving the leg, remained the only powers capable of such action.

The position of the fractured os femoris, says Mr. Pott, should be on its outside, resting on the great trochanter; the patient's whole body should be inclined to the same side; the knee should be in a middle state been perfect flexion, or extension, or half-bent; the leg and foot lying on their outside also, should be well supported by smooth pillows, and should be rather higher in their level, than the thigh; one very broad splint of deal, hollowed out, and well covered with wool, rag, or tow, should be placed under the thigh, from above the trochanter quite below the knee; and another somewhat shorter should extend from the groin below the knee on the inside, or rather in this posture on the upper side. The bandage should be of the eighteen-tail kind, and when the bone has been set, and the thigh well placed on the pillow, it should not without necessity, (which necessity in this method will seldom occur) be ever moved from it again, until the fracture is united; and this union will always be accomplished, in more or less time, in proportion as the limb shall have been more or less disturbed. (*Pott.*)

Here only two splints are mentioned; the surgeons of the present day always employ four. After placing the patient in a proper position, the necessary extension is to be made. Then the under-splint, having upon it a broad soft pad, and an eighteen-tailed bandage, is to be laid under the thigh, from the great trochanter to the outer condyle. The surgeon, before applying the soap plaster, laying down the tails of the bandage, and putting on the other three splints, is to take care that the fracture lies as evenly as possible.

In the position for a fractured thigh, Mr. Pott, we find, directs the leg and foot to be rather higher in their level, than the thigh; with what particular design I have not myself been able to make out. Whoever meditates upon the consequence of elevating the leg and foot above the level of the thigh, in the bent position, will know, that it is to twist the condyles of the os femoris more outward, than is natural. When a patient is placed, according to Mr. Pott's direction, upon a common bed, the middle soon sinks so much that the leg becomes situated very considerably higher than the thigh, and I am disposed to think, that this is one cause, why so many broken thighs are united in so deformed a manner, that the foot remains permanently

distorted outward. The great propensity of the triceps, and other muscles to produce this effect, may also serve to explain the frequency of the deformity. It is not merely the depression of the middle of the bed which is disadvantageous, as the weight of the patient's body falls more upon one side of the bed, than the other, in the bent position of the limb, unless the sacking is tight and the mattress very firm, it happens, that such a declivity is formed, as to render it exceedingly difficult, if not impracticable, to make the patient continue duly upon his side. It cannot be enjoined too forcibly, that fractured thighs should always be laid upon beds not likely to sink much. When this happens, no rational dependance can be put in the efficacy of the bent position, and, as Desault has explained, the same thing is hurtful also in the straight posture.

From what has been delivered it may easily be discerned, that inferences from anatomical circumstances are in most fractures of the thigh chiefly in favour of the bent position; for it appears, that of all those muscles which have primary influence over the majority of such accidents, that is, over all those which occur below the insertion of the gluteus maximus, there is only one muscle, viz. the rectus femoris, that is not more, or quite as much relaxed in it, as in the straight position. Since, however, experience is the great arbitrator of all practical questions, we must still look to it for decisive information, and to form a true judgment in this way, the straight and bent positions ought to be contrasted in every hospital with due attention to all collateral circumstances; the progress and termination of every case ought to be registered; and the comparative view, thus kept up, would quickly diffuse one kind of conviction throughout the profession. The most enthusiastic advocates for the bent position must allow, that it leaves the leg and foot too moveable and unsupported, and, that though it may relax the muscles, which have the most power to disturb the coaptation of a fractured thigh, it yet leaves unrelaxed a mass of muscle quite sufficient to displace the ends of the bone. Hence, it behoves practitioners to endeavour to improve the apparatus employed, so that it may make a permanent resistance to the action of the muscles. In the straight position, such resistance may certainly be practised with most effect and convenience.

There are some very excellent remarks on the treatment of fractured thighs in *Les Œuvres Chirurgicales de Desault par Bichat*. It is observed, that, if we compare the natural powers of displacement with the artificial resistance of most of our apparatuses, we shall find, that the disproportion between such forces is too great to make the former yield to the latter. The action of the muscles, however, which is always at first very strong, may afterwards be gradually diminished by the extension exercised on them. A power incessantly operating can effect, what another greater power temporarily applied, cannot at once accomplish, and the compression of circular bandages tends also to lessen the force of the muscles.

Desault cured in the Hôtel-Dieu an immense number of fractured thighs, without any kind of deformity. It was particularly to the well-combined employment of extension, and compression of the muscles, that such success was owing. The advantage of keeping the muscles a long while extended, in order to diminish their power, is especially evident in the reduction of certain dislocations, as those of the shoulder, in which we often cannot succeed till the muscles have been kept on the stretch for a greater, or lesser time. The fracture of the patella and olecranon equally demonstrates the utility of compression for the same purpose; as when the muscles are not compressed by the bandage they draw upward the fragment of bone with double, or triple force. (*Desault par Bichat.*)

Against reducing fractured thighs in the bent posture, Desault entertained the following objections: the difficulty of making the extension and counter-extension, when the limb is so placed; the necessity of then applying them to the fractured bone itself, instead of a situation remote from the fracture, as, for example, the lower part of the leg; the impossibility of comparing with precision the broken thigh with the sound one, in order to judge of the regularity of its shape; the irksomeness of this position long continued, though it may at first seem most natural; the inconvenient and painful pressure of a part of the trunk on the great trochanter of the affected side; the derangement, to which the limb is exposed when the patient has a motion; the difficulty of fixing the leg firmly enough to prevent the effect of its motion on the thigh-bone; the manifest impossibility of adopting this method, when both thighs are fractured; lastly, experience in France having been little in favour of such posture.

Also, what is gained by the relaxation of some muscles, is lost by the tension of others. For such reasons, (certainly strong ones,) Desault abandoned the bent position, and always employed the straight one, which was advised by Hippocrates, and all the Greek physicians.

Petit, Heister and Duverney, recom-

mend applying the extending means just above the condyles of the os femoris. Dupouy was one of the first to remark, that this practice rendered it necessary to employ very great force, and that it would be better to make the extension from the foot. Fabre takes into consideration also the inconvenience of the pressure, made on the muscles, which irritating and stimulating them to action, multiplies the obstacles to setting the fracture. Desault adopted their doctrine, for nearly the same motives, introduced it at the Hôtel Dieu, and the success he experienced in consequence, did not contribute a little to its wider diffusion.—(*Desault par Bichat.*)

Desault, as we have stated, preferred the straight posture, and laid his patients on surfaces, not likely to sink with the weight of the body. The feather beds, formerly in common use at the Hôtel-Dieu had this inconvenience; for these, in cases of fractures, Desault substituted a firm, tolerably hard mattress, which did not allow the continual change of posture to occur, which a soft bed does. The object of every apparatus being to keep the ends of the fracture from being displaced, the mechanism of every contrivance, for this purpose, should be directed against the causes of the derangement. These are, 1. the action of the muscles, drawing upward the lower end of the fracture; 2. the weight of the trunk propelling downward the upper end. Hence, every apparatus, intended to prevent derangement of a thigh fractured obliquely, should, 1. draw and keep downward the lower end of the fracture; 2. carry and maintain upward the upper end of the fracture, and the trunk, which is above it. This principle is of general application, and only subject to a few exceptions in transverse fractures, attended only with derangement in the direction of the diameter of the limb, or else none at all. 3. There must also be in the apparatus a resistance to the rotation of the lower portion of the broken bone, which will keep the limb steady, even in case of any sudden motion. (*Desault par Bichat.*)

If we compare the operation of the different pieces of our apparatuses with the above indications, we shall find, that, without permanent extension, they are not very effectual. With regard to bandages, whether a roller, or eighteen-tailed bandage, be used, they all have one common mode of operating; they press the muscles towards the ends of the fracture, so as to make them form a kind of natural case for the fracture, and thus they make lateral resistance against the parts In this manner, bandages materially aid in preventing derangement side-ways, and are particularly useful in transverse fractures. But, what is there to hinder the two inclined surfaces of an oblique fracture from slipping one over the other? What power is there to keep the limb from receiving the effects of accidental shocks? Is the pelvis kept back? Is the action of the muscles resisted? The latter is indeed somewhat diminished by the pressure, and this is the chief use of the bandage; but, will such compression be enough to prevent the longitudinal derangement of the broken bone, especially, if the bandage be applied slackly, as some advise? (*Desault par Bichat.*)

These remarks apply also to compresses; *petit moyen contre, une grande cause.*

Splints are useful in firmly fixing the limb, and guarding it from the effects of accidental shocks, or of contractions of the muscles. They operate more powerfully, than bandages, in preventing lateral derangement, and, hence, they suffice for transverse fractures, without any permanent extension being employed. They can also resist the rotation of the thigh outward, or inward. But, when the breach of continuity is oblique, will they hinder the ends of the bone from gliding over each other, and the consequent shortening of the limb? They obviously could only do so, by the friction of the different pieces of the apparatus, especially, the tapes, which fasten it, and then, to make the resistance effectual, they must be tied so tightly as to create a danger of mortification. Will the splints prevent the trunk from descending, and propelling before it the upper end of the fracture? Will they paralize the action of the muscles on the lower end? Will they, in short, fulfil all the above indications? Their use is almost limited to preventing lateral derangement, and steadying the limb. Hence, they should extend along the leg, as well as the thigh, which is disturbed by the motions of the lower part of the limb.

The pads are chiefly useful in keeping the limb from being galled by the splints, and tend only trivially to keep the fracture from being displaced.

From the above account, it appears, that the ordinary pieces of apparatus, which do not execute any permanent extension, may perhaps suffice for transverse fractures, which are not common; but, that they are always ineffectual, when the division is oblique, because they do not fulfil the two-fold indication of drawing downward the lower end of the fracture, and keeping the other one upward. (*Desault par Bichat.*)

Desault ascertained, that the object particularly to be aimed at, was such a disposition as that the foot, leg, thigh,

and pelvis, should constitute but one whole; so that, though the different parts thereof should be drawn in different directions, yet they should still, with respect to one another, preserve the same mutual relation. He invented the following apparatus to answer these purposes.

A strong splint, long enough to extend from the ridge of the os ilium to a certain length beyond the sole of the foot, is a principal part of this apparatus: this splint should be two inches and a quarter broad, and have each of its extremities pierced in shape of a mortice, and terminated by a semicircular niche. It is applied on the exterior side of the thigh, by means of two strong linen bands, each being more than a yard long.

The middle part of one of these bands is to be applied to the inside of the thigh, at its upper part; its ends are brought to the exterior side of the thigh, passed through the mortice, and knotted on the semicircular niche. Compresses are to be previously placed under the middle part of the band, in order to prevent any disagreeable pressure; as well as on the tuberosity of the ischium, which Desault considered as the principal point of action of this band. The inferior part of the leg is, in the next place, covered with compresses, on which the middle part of the second band is placed: the extremities of this band are crossed on the instep and upper part of the foot, then on the sole, after which they are conveyed outward, and one end passed through the mortice and knotted with the other on the niche, with such a degree of force as to pull the inferior portion of the femur downward, and to push the splint upward, and, by this means, the pelvis and superior fractured portion. On the internal side of the limb is placed a second splint, which extends from the superior part of the thigh, to a certain distance beyond the foot. A third is placed on the anterior part, and extends from the abdomen to the knee. The superior extremities of the anterior and exterior splints are fixed by means of a bandage passed round the pelvis. A band, the middle part of which is placed under the sole of the foot, and the extremities crossed on its superior surface, and fastened to the splints, prevents the motion of the foot, as do also the splints.

Before applying the apparatus, the whole limb is to be covered with compresses, wet with a solution of the acetite of lead. Over these, Scultetus's bandage is to be put, and a roller round the foot, all moistened in the same manner. For more particulars, the reader is referred to the *Parisian Chirurgical Journal, Vol.* 1. *ou les Œuvres Chirurgicales de Desault par Bichat*; *Leçon's sur les Maladies des Os; Richerand's Nosographie Chirurgicale, Tom.* 3.

Fractures of the Neck of the Thigh-bone.

This part of the bone may be fractured either by falls on the great trochanter, on the sole of the foot, or the knee. But the first accident produces the injury much more frequently, than the latter ones. Of thirty cases, which occurred to Desault, four-and-twenty arose from falls on the side. All those inserted by M. Sabatier in his interesting Memoir, were the result of a similar accident.

1. The fracture may take place in the middle of the neck, where there is less thickness, and the texture is not compact, as in the middle of the cylindrical bones, which are so much exposed to fractures.

2. Where it is united to the head of the bone.

3. Where it joins the great trochanter, in which event, the breach of continuity may be on the outside of the joint, which happens more frequently, than has been supposed.

The division is seldom oblique, almost always transverse; the neck being sometimes, in the latter case, wedged in the body of the bone, as Desault found in several instances; a model of one of which, in wax, is preserved in the collection of *L'Ecole de Santé*, and the natural specimen of which was in the possession of Bichat. The fracture of the neck of the thigh-bone is sometimes complicated with that of the trochanter major.

The diagnosis is occasionally so difficult, that the best-informed practitioners cannot always ascertain the accident with certainty. At the instant of the fall, an acute pain is felt, (sometimes a crack is distinctly heard) and a sudden inability to walk occurs; the patient cannot raise himself from the ground, which, however, is not invariably the case. In the fourth vol. of the *Mem. de l'Acad. de Chirurgie*, a case is related, in which the patient walked home after the accident, and even got up the next day. Desault published a similar example. The locking of one end of the fracture in the other, may offer an explanation of this circumstance.

A shortening of the limb almost always takes place; but this symptom is more or less striking, according as the breach of continuity is out of the cavity of the orbicular ligament, which then keeps the bone from being retracted; or as the extremity of the fracture is confined by this ligament. The action of the muscles drawing upward the lower end of the fracture, the weight of the trunk propelling downward the pelvis and upper end of the fracture, are the two causes of the

shortening of the limb. A slight effort suffices, in general, for the removal of this shortening of the limb; but, the symptom recurs almost as soon as such effort ceases; and Goursault and Sabatier have remarked, that it sometimes does not take place at all, till a long while after the accident. A swelling is observable at the upper and front part of the thigh, always proportioned to the retraction, of which it appears to be an effect.

The projection of the great trochanter is almost entirely effaced. Directed upwards and backwards, this eminence becomes approximated to the crista of the os ilium; but, if pushed in the opposite direction, it readily yields; and, when arrived at its natural level, the patient becomes capable of moving his thigh.

The knee is a little bent. Abduction of the limb always occasions acute pain. If, while the hand is placed on the great trochanter, the limb is rotated on its axis, this bony projection may be felt revolving on itself, as on a pivot, instead of describing, as in the natural state, the segment of a circle, of which the neck of the femur is the radius. This symptom, which was particularly noticed by Desault, is very manifest when the fracture is situated at the base of the neck, less so when at its middle; and it is not very perceptible when the breach is near the head of the bone. In the rotatory motions, the lower fragment rubbing against the upper one, produces a distinct crepitus, which, however, is not an invariable symptom.

The toes are usually turned outward; a position which Sabatier, &c. consider as the inevitable effect of the fracture, though Pare and Petit have noticed, that it did not constantly occur. Two cases adduced by these illustrious surgeons, were not credited by M. Louis; but the experience of Desault has fully confirmed the possibility of the occurrence.

The position outward is commonly imputed to the rotator muscles. But, then it is clear, that such position ought always to exist; that all the muscles, which proceed from the pelvis to the trochanter, are, with the exception of the quadratus, in a state of relaxation, by the approximation of the femur to their point of insertion; and that the contracted muscles would not allow the foot to be so easily turned inward again. It is not more probable that the weight of this part itself may pull it into the position, in which it is commonly found.

It follows from the preceding account, that none of the symptoms of a fracture of the neck of the thigh-bone are exclusively characteristic; that each considered separately, would be insufficient, and that their assemblage can alone throw light on the diagnosis. In every instance of doubt, however, the sure course must be pursued, and the apparatus applied, which, though useless, is not dangerous, should the injury not exist, and is indispensably necessary when it does. (*Desault par Bichat.*)

It was at one time supposed, that fractures of the neck of the thigh-bone could not be cured, without some shortening of the limb, and lameness, remaining afterwards. Professor Ludwig, Sabatier, and M. Louis, broached this doctrine, and imputed the circumstance to the destruction of the neck of the bone. Desault, however, rarely met with instances of such lameness in his practice.

The treatment of these cases is not at all different from that of other fractures of the body of the bone. Most surgeons in this country adhere to Mr. Pott's plan of laying the limb in a bent posture; while, in France, they prefer the straight position, with Desault's apparatus, above described.

Fracture of the Patella.

This bone is almost always broken transversely, and the accident may be occasioned either by the action of external bodies, or by that of the extensor muscles. In the latter case, the fall is only consequent to the fracture, and, as Camper has remarked, is most frequently only an effect of it. For instance, the line of gravity of the body is, by some cause or another, inclined backward; the muscles in front contract to bring it forward again; the extensors act on the patella; this breaks, and the fall ensues. A soldier broke his patella in endeavouring to kick his serjeant; the olecranon has been broken in throwing a stone. A man, at the Hôtel-Dieu, fractured both bones of his knee, in the operating theatre there, by the violent spasms of the muscles, which followed an operation for the stone. The force of the muscles occasionally ruptures the common tendon of the extensor muscles, or, what is more frequent, the ligament of the patella. Petit, Desault, and Sabatier, have remarked these occurrences. The patella can only be broken longitudinally by outward violence. Here it is only necessary to treat of transverse cases.

The symptoms are, a considerable separation between the two fragments of the bone, very perceptible to the finger, when the hand is placed on the knee. This separation is not occasioned equally by both portions, the upper one, embraced by the extensor muscles, is drawn upward very forcibly by these powers, which the patella no longer resists. The inferior portion, being merely connected with the ligament below, is, on the contrary, not

moved by any muscle, and can only be displaced by the motions of the leg, to which it is attached. Hence the separation is least when the limb is extended, as it is then only produced by the upper fragment; greatest, when the limb is bent, because both pieces contribute to it; and it may be increased, or diminished, by bending the knee more or less.

The diagnosis is also made clearer, by the possibility of moving the two portions of bone transversely, so as to cause a crepitus and pain. The swelling of the knee, apt to follow fractures of the patella, may, when very great, obscure the other diagnostic symptoms. The difficulty of standing up, and the almost utter inability of walking, in consequence of the extensors not being able to move the leg, unless the fracture be very low down, are other symptoms.

The two grand indications, in the treatment of the fractured patella, are to overcome the action of the extensor muscles of the leg, and to keep this part immoveably extended. The latter object is easily accomplished; the first requires, that the contractile force of the muscles should be first lessened, so as to diminish the effort, which they make to draw up the superior portion of the bone, and then to oppose to them a mechanical resistance, which, operating in a diametrically opposite direction, will render their efforts ineffectual.

The power of the muscles is to be diminished by relaxing their fibres, which may easily be done, by bending the thigh on the pelvis, and extending the leg, and by compressing the muscles with a roller. With regard to the mechanical resistance, which must operate directly against the contraction of the muscles, and prevent them from pulling upward the superior portion of the patella, it should consist of something placed and maintained above it, with sufficient force to keep it from ascending.

Desault used to set a fractured patella as follows: one assistant fixes the pelvis, while another keeps the leg completely extended on the thigh, and this on the pelvis. The surgeon, standing on the side of the fractured limb, is to apply a longitudinal linen compress to the whole front of the leg and thigh, taking care to make two openings in it, corresponding with the sides of the patella. This strip of linen is to be then fixed, by two or three turns of a roller, at the ankle; its lower end then turned up, and the roller also applied over it. The circular bandage is next to be continued to just below the knee, when the surgeon is to push upward the lower portion of the patella, apply two or three turns of the roller just below it, in order to fix it; desire an assistant to hold the roller, enjoin him, who has the care of the longitudinal piece of linen, to draw it up firmly, while the integuments are pushed in the same direction, lest they should sink between the two pieces of the bone. The fingers of the left hand are then to be introduced into the openings of the linen compress, for the purpose of pushing downwards the upper part of the patella.

The two pieces being in accurate contact, the surgeon takes the roller again; carries it obliquely behind the ham, brings it up behind the upper part of the bone, withdraws his fingers, which served to keep it down, substitutes for them two or three moderately tight turns of the bandage, then covers the whole of the knee and thigh with the same. When arrived as high as the upper part of the limb, the assistant, who draws the longitudinal piece of linen forcibly upwards, is to turn down its ends over the circles of the roller, with a few turns of which it is then to be fixed. The bandage is then to be applied round the limb down to the ankle, where its application is to end.

The separation of the lower fragment is further to be prevented by extending the leg on the thigh, and the muscles relaxed by extending the latter on the pelvis. Nothing keeps the leg more surely extended, than a long, strong splint, which Desault next applied to the posterior part of the thigh and leg, and fixed there with a roller, while the thigh itself is to be bent by raising the whole limb, from the heel to the top of the thigh, with pillows, which, of course, must form a gradual ascent from the tuberosity of the ischium to the foot.

Desault used also to keep all the apparatus wet with the saturnine lotion. (*Desault par Bichat.*)

The above method certainly fulfils every indication; and the chief trouble of the surgeon is to keep the bandages from becoming too slack. In this country, practitioners overlook many little niceties of apparatus, which the French are, perhaps, too fond of, and, in the case of a fractured patella, trust to the roller, applied with tolerable tightness, just above the upper piece of the bone, and then over the knee, in the form of a figure of 8, while the limb is kept in the above position, with a splint and pillows.

The broken patella is almost always united by a ligamentous substance, instead of a bony one. Pott, and some others, thought, that there being commonly an interspace afterwards between the two pieces of the patella, with a certain length of the connecting substance might be advantageous in the motion of the joint; but Desault always noticed, that the greater the distance between the

two pieces of the bone, the greater was the difficulty afterwards in walking up a rising, or over an unequal ground.

Fractures of both Bones of the Leg.

These may be transverse or oblique. The longitudinal derangement is much less common than the horizontal or angular. In the former case, the inferior pieces are almost always drawn outward and backward, whilst the superior project internally and forward. The angular derangement may be produced either by the action of the posterior muscles of the leg, or the weight of the body, and in either case the angle will be salient anteriorly. The salient angle may take place posteriorly, if the heel be too much raised. The derangement in the circumference arises from the inclination of the foot inward or outward, but it most commonly falls in the latter direction. The longitudinal derangement is extremely rare, and cannot easily take place in transverse fractures, on account of the considerable extent of the fractured surfaces; but, in oblique fractures, the inferior pieces are almost always drawn upward by the action of the posterior muscles of the leg, in which position of the parts the lower ends of the superior portions project anteriorly, and may be felt by the hand. Sometimes, however, when the solution of continuity is obliquely downward and outward, the anterior projection will be produced by the lower pieces. In some cases, the pointed ends of the bones tear and penetrate the integuments in both kinds of derangement, so as to cause a compound fracture.

The usual symptoms denoting a fracture of the leg, are, change of direction and shape of the limb, pain, and incapability of motion, mobility of the fractured pieces, and a crepitus always distinct, &c.

Fractures, which take place near the knee, are not much subject to derangement, on account of the thickness of the bone at that part; but are, however, more dangerous than those of the middle part, as being subject to be followed by a stiffness of the knee-joint. Fractures of the inferior part are still more dangerous. Oblique fractures are very difficult to be managed; and when their derangement is upward and outward, the integuments are very apt to be torn by the projecting points of the superior portions of bone. (*Boyer.*)

Fractures of the Tibia.

If the fracture take place near the ankle, the great extent of the fractured surfaces prevents any considerable derangement of the fractured portions; and the fibula acting as a support on the external side, contributes also to this effect.

This circumstance renders a diagnosis of fractures of the tibia often very difficult, and the difficulty is further increased by the little pain and inconvenience produced by such a fracture, with which persons have been known to walk.

Whenever there is reason to suspect the accident, in consequence of a blow or a fall on the leg, the part should be minutely examined. The fingers are to be moved along the anterior side of the tibia, the slightest inequality in which may be easily perceived, on account of its being covered only by the skin; and the motion of the pieces may be perceived, by grasping the opposite ends of the bone and pushing them in contrary directions. This motion, however, and the crepitus which accompanies it, are very indistinct, on account of the fibula not allowing the fractured portions to be sufficiently moved on one another. (*Boyer.*)

Fractures of the Fibula.

Sometimes the foot is turned forcibly inwards or outwards, in which case, the ligaments of the articulation are always strained, and very frequently lacerated. It is in a case of this kind, when the foot is forcibly turned outwards, that the fibula is fractured by the pressure of the astragalus. We have given Pott's account of such accident in the article *Dislocation.*

To the fractures, produced by this cause, are to be added those resulting from a fall, or a blow on the external side of the leg, in which the bone always yields in the part to which the force is immediately applied.

Whatever be the manner, in which a fracture of the fibula is produced, the pieces are not susceptible of the longitudinal derangement; but are in all cases drawn a little towards the tibia, by the muscles placed in the interspace between them. Hence a fracture of this bone will be best ascertained by pressing the fractured portions inward. This symptom, and the consequent crepitus, may be also observed in the abduction and adduction of the foot. These signs are more evident when the fracture takes place near the ankle, than when it happens high up, where the bone is covered with thick muscles. (*Boyer.*)

Treatment of Fractures of the Leg.

As in cases of fractured thighs, the practitioner may adopt either a bent or a straight position of the limb. In this country, surgeons mostly follow Mr. Pott's advice, and select the first one, of which alone I shall treat.

" In the fracture of the fibula only, the position is not of much consequence; be-

cause by the tibia remaining entire, the figure of the leg is preserved, and extension quite unnecessary; but still, even here, the laying the leg on its side, instead of on the calf, is attended with one very good consequence, viz. that the confinement of the knee, in a moderately bent position, does not render it so incapable of flexion and use afterward, as the straight or extended position of it does, and consequently, that the patient will be much sooner able to walk, whose leg has been kept in the former posture, than he whose leg has been confined in the latter.

"In the fracture of both tibia and fibula, the knee should be moderately bent, the thigh, body, and leg, being in the same position as in the broken thigh. If common splints be used, one should be placed underneath the leg, extending from above the knee to below the ankle, the foot being properly supported by pillows, bolsters, &c. and another splint of the same length should be placed on the upper side, comprehending both joints in the same manner; which disposition of splints ought always to be observed, as to their length, if the leg be laid extended in the common way, only changing the nominal position of them, as the posture of the leg is changed, and calling what is interior in one case, exterior in the other; and what is superior in one, in the other inferior.

"If Mr. Sharp's splints be made use of, there is in one of them a provision for the more easy support of the foot and ankle, by an excavation in, and a prolongation of the lower, or fibular splint, for the purpose of keeping the foot steady." (*Pott.*)

The strong muscles of the leg being relaxed by placing the limb in the bent position, as advised by Pott, the surgeon is to make such extension as seems requisite, for bringing the ends of the fracture into even apposition. Then he is carefully to raise the leg a little way from the surface of the bed, by taking firmly hold of the limb, above and below the fracture, and elevating the broken bones together, in such a way as shall keep both the upper and lower portions as nearly as possible on the same level. At this moment, an assistant should put, exactly beneath the leg, the under splint, which has been previously got ready, by covering it with a soft pad, and laying over this an eighteen-tailed bandage. The limb is now to be gently depressed, till it rests on the apparatus. The surgeon, before proceeding further, must once more observe that the ends of the bones are evenly in contact. Being assured of this important point, he is to apply a piece of soap plaster, and lay down the tails of the bandage. Another soft pad, well filled with tow, is next to be put over the upper surface of the leg, and over that the other splint, when the straps are to be tightened.

Fractures of the Scapula.

The acromion, inferior angle, neck, and coracoid process, are the parts most commonly fractured. When the acromion is broken, the weight of the arm, and the contraction of the deltoid muscle, draw it downward, while the trapezius and levator scapulæ draw the rest of the bone upward and backward. The serratus major anticus draws forward the lower angle, when this part is fractured, while the rest of the scapula remains in its natural situation; or, if the angular portion be considerable, the teres major, and some fibres of the latissimus dorsi, contribute to its derangement forward and upward.

The pectoralis minor, coraco-brachialis, and short head of the biceps, concur in drawing forward and downward the coracoid process, when it is broken. (*Boyer.*)

When the neck of the scapula is fractured, the weight of the arm makes it drop down so considerably, as to give the appearance of a dislocation; but, the facility of lifting the os brachii upward, the crepitus, and the falling of the limb downward again, immediately it is unsupported, are circumstances clearly marking, that the case is not a dislocation. Sometimes great pains, and a crepitus, are experienced, on moving the shoulder-joint, after an accident; and yet the spine, that part of the scapula, and all the above parts, are not broken. In this circumstance, we may suspect either that a small portion of the head of the os brachii, or a little piece of the glenoid cavity of the scapula, is broken off; which latter occurrence I think is not a very uncommon one.

Fractures of the acromion are attended with pain, which is increased by the motion of the arm; the form of the shoulder is changed; the broken part, which has descended, may be raised, by bringing up the elbow close to the side. (*Boyer.*)

When the inferior angle is broken, the part remains motionless, while the rest of the scapula is moved; and it is so separated, that no mistake can be made. (*Boyer.*)

Fractures of the spine and body of the bone, are all attended with a crepitus; and, in the first cases, an irregularity in the course of the spine of the bone may generally be easily felt.

TREATMENT.

When the scapula is fractured longitu-

dinally, or transversely, it is merely necessary to fix the arm to the side by means of a bandage, which includes the arm and trunk, from the shoulder to the elbow. Thus the motions of the shoulder, which are only concomitant with those of the arm, are prevented. (*Boyer.*)

When the inferior angle is broken, and drawn downward and forward by the serratus major anticus, the scapula must be pushed toward the fragment, by pushing the arm itself inward, downward, and forward, where it is to be kept with a roller. The fragment is also to be kept backward, as much as possible, with compresses and a roller. The arm is to be supported in a sling. (*Boyer.*)

The fractured acromion requires the arm to be so raised, that the head of the os brachii will push up the acromion, while an assistant pushes the scapula forward and downward, in a contrary direction to that of the arm. To maintain this position, a circular bandage is to be applied round the arm and body.

Desault used to apply also a small pillow under the axilla, before putting on the bandage, to make the head of the os brachii project more upward, on bringing the arm near the side. Compresses are to be placed on the scapula, which, with this means, and a roller, are to be kept downward and forward.

When the coracoid process is fractured, the muscles attached to it are to be relaxed, by bringing the arm forwards towards the breast, and confining it there in a sling; while the shoulder is kept downward and forward, and a compress confined just under the broken part, with a roller.

The treatment of a fracture of the neck of the scapula consists in raising the shoulder to its proper height; in completely taking off the weight of the arm, by wearing a proper sling, which always supports the limb from the elbow to the fingers; and in entirely preventing all motion of the arm by binding it to the trunk with a roller.

Fractures of the Clavicle.

This bone being long and slender, unsupported at its middle, and protected externally only by the integuments, is very often broken. Its serving to keep the scapula at a proper distance from the sternum, and as a *point d'appui* for the os brachii, every impulse of which it receives, makes its fractures still more common.

It may be broken at any part; but, its middle, where the curvature is greatest, is most frequently the situation of the injury. It is not very often fractured at its scapulary extremity. However, a direct force, falling on the shoulder, may break any part of the clavicle, on which it immediately acts. The soft parts, in this kind of case, will also be contused, or even lacerated.

A comminuted fracture may be thus occasioned, and, if the violence be very great, the subclavian vessels and nerves may be torn. The fall of a heavy body on the shoulder often gives rise to a paralysis of the arm.

When the fracturing force is applied to the ends of the bone, as by a fall on the point of the shoulder, or on the hands, while the arms are extended, the clavicle may be very much bent, and fractured so obliquely, that the broken portions shall protrude through the skin.

Fractures of this bone are usually attended with derangement of the broken ends, except when the injury takes place at the scapulary extremity, and within the ligament, tying together the clavicle and coracoid process.

The external portion of the clavicle is always that which is deranged. The internal part cannot be moved out of its natural situation, by reason of the costo-clavicular ligaments, and of its being drawn in opposite directions, by the sterno-cleido-mastoideus, and pectoralis major, muscles. The external portion, drawn down both by the weight of the arm, and the action of the deltoid muscle, and forward and inward by the pectoralis major, is carried under the internal portion which projects over it. The broken clavicle no longer keeping the shoulder at a due distance from the sternum, the arm falls forward towards the breast. The patient finds it impossible to put his hand to his forehead, because this act makes a semicircular motion of the humerus necessary, which cannot be done while that bone has not a firm *point d'appui*. The shoulder and upper extremity may be observed to be nearer the breast than those of the opposite side. The motion of the pieces of bone on one another may be felt, as well as the projection of the end of the internal portion. When the shoulder is moved, a crepitus may also be perceived, but doing this is productive of great pain, and the diagnosis is so obvious, that it is quite unnecessary.

The ancients, and many moderns, have supposed, that in order to set a fracture of the clavicle, the shoulder must be drawn back, and fixed in that position. The patient was placed on a low stool, so that an assistant might put his knee between his shoulders, which he drew back at the same time with both hands, while the surgeon applied the bandage, which was to keep the parts in this position. But, in thus drawing the shoulders towards one another, the scapula is obviously pushed towards the sternum,

and with it the external portion of the clavicle, which passes under the internal one.

The figure of 8 bandage has commonly been used for maintaining the parts in this position. While the assistant keeps back the shoulders, as above described, the surgeon is to apply one end of a roller to the arm-pit on the side affected, and then make it cross obliquely to the opposite shoulder, round which it is to pass, and from this to the other shoulder, about which it is to be rolled in the same manner, and crossed afterwards repeatedly before and behind. The tightness, with which it is necessary to apply this bandage, produces a great deal of excoriation about the arm-pits, and the effect is to make the ends of the fracture overlap each other, the very thing which it is wished to avoid. Boyer remarks, that the iron-cross proposed by Heister, the corselet described by Brasdor in the *Mem. de l'Acad. de Chir.* and the leather strap recommended by Brunninghaussen, are only modifications of the figure of 8 bandage, and are not at all better.

Extension is to be made, by means of the limb, which is articulated with the fractured bone. This is done by converting the humerus into a lever, by carrying its lower end forward, inward, and upward, pushing the shoulder backward, upward, and outward, and putting a cushion in the arm-pit to serve as a fulcrum.

Desault used to put in the arm-pit a hair or flock cushion, five or six inches long, and three inches and a quarter thick at its base. Two strings are attached to the corners of the base, placed upward, which cross the back and breast, and are tied on the shoulder of the other arm. The cushion being thus placed in the arm-pit, and the fore-arm bent, Desault used to take hold of the patient's elbow, and carry it forward, upward, and inward, pressing it forcibly against the breast. By this manœuvre, the humerus carries the shoulder outward, the ends of the fracture become situated opposite each other, and all deformity is removed.

An assistant is to support the arm in this position, while the surgeon, having a single-headed roller nine yards long, is to place one end of it in the arm-pit of the opposite side, and thence apply the bandage over the upper part of the arm, and across the back to the same situation. The arm and trunk are to be covered with such circles of the roller, as far down as the elbow, drawing the bandage more tightly, the lower it descends.

Compresses, dipped in camphorated spirit, are next to be placed along the fractured bone. Desault then used to take a second roller, of the same length as the first, and put one end of it under the opposite arm-pit, whence it was carried across the breast over the compress and fracture, then down behind the shoulder and arm, and, after having passed under the elbow, upward on the breast. Desault next brought it across to the sound shoulder, under and round which he passed it, for the purpose of fixing the first turn. He then conveyed the roller across the back, brought it over the compresses, carried it down in front of the shoulder and arm, under the elbow, and obliquely behind the back to the arm-pit, where the application began. The same plan is repeated, until all the roller is spent. The apparatus is to be secured by pins, wherever they promise to be useful, and the patient's hand is to be kept in a sling.

Boyer has invented an apparatus for fractured clavicles, which is more simple, than that employed by Desault.

The cushion is to be applied under the arm. The apparatus consists of a girdle of linen cloth, which passes round the trunk on a level with the elbow. It is fixed on by means of three straps, and as many buckles. At an equal distance from its extremities are placed externally on each side two buckles, two before and two behind the arm. On the lower part of the arm, is to be laced a piece of quilted cloth, five or six fingers broad. Four straps are attached it, which correspond to the buckles on the outside of the girdle, and serve both to keep the arm close to the trunk, and from moving either backward or forward. (See *Boyer's Lectures upon the Diseases of the Bones.*)

Certainly, the methods recommended by Desault and Boyer are very judicious and scientific. They are not, however, much adopted in this country, perhaps in consequence of the universal aversion among English surgeons to all apparatuses, which are not exceedingly simple. It is to be hoped, at the same time, that, in the treatment of fractured clavicles, they will always attend to the principles, which Desault and Boyer have inculcated. If they understand, why the position of the arm should be such as these eminent surgeons point out, they will have no difficulty in doing what is proper, and with a cushion sling, and a couple of rollers, they will easily maintain the proper posture.

I cannot quit this subject without cautioning the surgeon never to fall into the error of supposing the rising end of a broken clavicle to be the end which is displaced. This is the one, which is truly in its right situation, and which has often been made, by injudicious pressure, to protrude through the integuments, as I myself have seen.

FRACTURES OF THE OS BRACHII, OR HUMERUS.

This bone may be fractured at any point of its length; in the middle, at either extremity, or above the insertion of the pectoralis major, latissimus dorsi, and teres major. This last case is termed fracture of the neck of the humerus; but that denomination has not the merit of being strictly anatomical. It is possible, however, that what is strictly called the neck of the humerus may be fractured, particularly, by a gun-shot wound. By neck of the humerus, we understand that circular narrowing, which separates the tuberosities from the head.

The fractures of this bone may be transverse or oblique, simple or compound. In short, whatever has been said of the differences of fractures in general, is applicable to those in particular. The same may be said of the causes, whether acting on the extremities of the bone, or immediately on the part fractured.

The transverse fractures of the middle part, under the insertion of the deltoid muscle, are attended with but a trifling derangement. The brachialis internus and the triceps, attached posteriorly and anteriorly to both fractured portions, counteract one another, and admit only a slight angular derangement. When the fracture takes place above the insertion of the deltoid muscle, the inferior portion is first drawn outward and then upward on the external side of the superior. Fractures of the humerus, near its lower end, such particularly as are transverse, are not subject to much derangement: an effect which is to be attributed to the breadth of the fractured surfaces; to their being covered posteriorly by the triceps muscle, and, anteriorly, by the brachialis internus, which admit only a slight angular derangement by the inferior portion being drawn a little forward.

Oblique fractures are always attended with derangement, whatever be the part fractured. The inferior portion being drawn upward by the action of the deltoides, biceps, coraco-brachialis, and long portion of the triceps, glides easily on the superior, and passes above its lower extremity. Finally, fractures of the neck of the humerus are always attended with derangement, which is produced by the action of the pectoralis major, latissimus dorsi, and teres major, which being attached to the lower portion near its superior extremity, draw it first inward and then upward, in which last direction it is powerfully urged by the biceps, coraco-brachialis, and long portion of the triceps. The superior portion itself is, in this case, directed a little outward by the action of the infraspinatus, supraspinatus, and teres minor, which make the head of the humerus perform a rotatory motion in the glenoid cavity.

We proceed to examine the different marks, by which these fractures may be ascertained.

The shortening and change in the direction of the limb, the crepitus, which may be very distinctly perceived by moving the broken pieces in opposite directions, the pain, and impossibility of moving the arm, &c. joined to the history of the preceding circumstances, render it easy to establish a diagnosis.

Fractures of the neck of the humerus are not so easily ascertained, and have been frequently, for want of attention, confounded with luxations of that bone. The diagnostic symptoms of these two affections are however very different.

When the neck of the humerus is fractured, a depression is observed at the superior extremity and external side of the arm, which is very different from that accompanying the luxation downward and inward of that bone. In the latter case, under the projection of the acromion, a deep depression is found in the part which the head of the humerus naturally occupies; whereas, in the fracture of the neck of that bone, the shoulder retains its natural form, the acromion does not project, and the depression is found below the point of the shoulder. Besides, in examining the arm-pit, instead of finding there a round tumour formed by the head of the humerus, the fractured and unequal extremity of that bone will be easily distinguished. The motion of the broken portions, and the crepitus, which may be produced by moving them, serve still further to establish the diagnosis. (*Boyer on the Bones, Vol.* 1.)

A simple fracture of the body of the humerus is not very dangerous; but, in that near the ends of the bone, there is some reason to expect the neighbouring joint to inflame, and remain stiff for some time after the cure.

In ordinary fractures of the os brachii, it is usual to apply two pieces of soap-plaster, which together surround the limb, at the situation where the accident has happened. Extension, if necessary, being now made by an assistant, who at once draws the lower portion of the bone downward and bends the elbow, the surgeon is to apply a roller round the limb. The external splint is to extend from the acromion to the outer condyle, and, being lined with a soft pad, the wood cannot hurt the limb by pressure. The internal splint is to reach from the margin of the axilla to a little below the inner condyle, and is to be well guarded with a pad, filled with tow, or any other soft materials.

Some surgeons are content with the application of two splints; but, though the two, above described, are those on which we are to place the greatest reliance, yet, as the cylindrical form of the arm conveniently allows us completely to incase this part of the limb in splints, I shall always be an advocate for the employment of four; one on the outside, one on the inside, one on the front, and another on the back of the arm. These are to be carefully fixed in their respective situations by means of tape.

The elbow and whole of the fore-arm are to be quietly and effectually supported in a sling, throughout the whole treatment of the case.

FRACTURE OF THE HEAD, OR NECK OF THE OS BRACHII.

1. *General Considerations.*

Chirurgical language here differs from that adopted by anatomists, and, under the name of fracture of the neck of the humerus, is not meant, that of the circular, hardly perceptible depression, which separates the head from the tuberosities of this bone. By this expression, surgeons imply the fracture of that contracted part of the humerus, which is bounded above by these tuberosities, which below is continuous with the body of the bone; which has the tendons of the pectoralis major, latissimus dorsi, and teres major inserted below it; and which many practitioners extend even as low as the insertion of the deltoid muscle.

Indisputable facts, however, prove the possibility of the anatomical neck of the bone being fractured, and C. Larbaud shewed Bichat the humerus of a young man, aged 17, the head of which bone was accurately detached from its body, by a division which had obliquely interested the upper part of the tuberosities. But there are too few instances of this kind, in the records of surgery, to admit of our taking a general view of this sort of fracture.

2. *Varieties and Causes.*

The operation of external bodies, active, when driven against the shoulder, passive, when the shoulder or arm is driven against them, is the constant cause of the fracture of the neck of the humerus. The solution of continuity, thus occasioned, is sometimes direct, and at other times, the result of a *contre-coup*.

The first almost always arises from a fall on the fleshy part of the shoulder, and, as the motion must be exceedingly violent to produce this effect through the thick covering formed by the deltoid, this muscle is sometimes contused and affected with ecchymosis. Even blood may be effused from some of the ruptured articular veins, or arteries, and form a collection, which Desault has remarked should be speedily opened.*

The counter-fracture arises from a fall on the elbow, when this part is separated from the trunk, or else from a fall on the hand, which a natural instinct makes us extend, with the arm and fore-arm, to protect ourselves at the time of falling.

3. *Symptoms, &c.*

The whole of the symptoms of a fracture of the neck of the humerus sufficiently denote its existence; but, it is not always an easy matter to see this whole, and here more difficulties occur in the diagnosis, than in any other fracture of the humerus.

There is an acute pain experienced at the moment of the fall; sometimes, the noise of something breaking is heard. There is always a sudden inability to move the limb, which, left to itself, remains motionless. But, on external force being applied to the member, this readily yields, and admits of being moved, with the greatest ease, in every direction.

An acute pain attends such motion, which, carried too far, may cause bad consequences, as has been observed in patients in whom the fracture has been mistaken for a dislocation.

Below the acromion a depression is remarkable, always situated lower down, than that which attends the latter accident. If we place one hand on the head, while the lower part of the bone is moved in various directions with the other hand; or if, while extension is made, an assistant communicates to the bone a rotatory motion, the following circumstances are perceived. 1. We discover, that the head of the humerus remains motionless. 2. A more or less distinct crepitus, arising from the two ends of the fracture rubbing against each other. These two symptoms are invariably characteristic of the accident; but the swelling of the joint sometimes prevents us from detecting them.

The ends of the fracture are sometimes not at all deranged, and, as then most of the symptoms are absent, the diagnosis is rendered still more difficult. In general, however, the ends of the fracture are displaced, and, in this circumstance, it is the lower one which is out of its proper posi-

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* I must enter my protest against such practice, however; both because I have observed that large extravasations of blood about the shoulder are usually very soon absorbed, and making an opening may do harm, and cannot do good.

tion, and not the upper one, which is of little extent, and is not acted upon by many muscles.

The displaced state of the fracture is, generally, not very perceptible, in regard to length, unless the fracture be very oblique, and its pointed spiculæ irritate the muscles, and make them contract with increased power; or unless the blow, which is very violent, continue to operate after the bone has been broken, and force the ends of the fracture from their state of apposition. In this way, the body of the bone has been known to have been drawn or driven upward, so as to protrude through the deltoid muscle, and integuments far above the height of the head of the bone.

But commonly, as Petit observes, the weight of the limb powerfully resists the action of the muscles, and the derangement of the fracture is more liable to be transverse. In this circumstance the lower end of the fracture is displaced outward or inward, and very rarely in any other direction. In the case, which is much the most frequent, the elbow is separated from the trunk, and cannot be brought near it without pain; in the instance of the bone being displaced outward, the limb has a tendency to the opposite direction.

4. *Prognosis.*

A fracture of the neck of the humerus is not a serious event, and if, as Heister remarks, *prope caput, fractura pejor, et difficilius curatur*, it is less on account of the nature and situation of the disease, than of the difficulty experienced in maintaining the ends of the fracture in contact.

5. *Reduction.*

This object usually presents but few difficulties, and the multiplicity of means formerly employed for its accomplishment, serve only to exhibit the uselessness of such resources.

Most of the machines, designed for reducing dislocations of the humerus, have been applied to this kind of fracture. To such machines succeeded the use of pulleys, weights suspended to the limb, &c. useless plans, as their only tendency was to increase the natural power, which was always more than sufficient.

Petit proposes to reduce the fracture, by first placing the arm at a right angle with the body; and then making extension with the hands of an assistant, applied above the elbow; while the counter-extension is made by another assistant, who is to take hold of the fleshy part of the shoulder. This method is liable to three kinds of inconveniences. It fatigues and even pains the patient; it lessens the extending powers by bringing them near the moveable point, it irritates such muscles as proceed from above to the lower end of the fracture, and thus increases their disposition to contract. Hence difficulties sometimes attended the reduction, which is always simple, when, the trunk being fixed, gentle extension is made on the fore-arm half bent. Desault used to accomplish the reduction in the following way.

The patient may either sit upon a chair, or the edge of a bed. The arm is to be a little separated from the trunk, and carried somewhat forward.

An assistant is to fix the trunk by drawing towards him the arm of the opposite side. This mode of making extension is preferable to that commonly employed, and which is effected by applying the hands to the upper part of the affected shoulder. The other being more distant from the resistance, there is no need for exerting so much power; and the patient's body being quite uncovered, the surgeon can conveniently apply the bandage, without deranging the extension.

A second assistant extends the fore-arm half bent, which he makes use of as a lever, placing one hand behind the wrist for the purpose of a fulcrum. The other hand, applied to the front and middle part of the fore-arm, and making pressure upon it from above downward, represents the power. The ends of the fracture, which are to be placed in apposition, form the resistance.

The relaxation of muscles, produced by the half flexion of the fore-arm, and the position of the arm a little raised from the side, are peculiarly favourable to this mode of extension, recommended by the ancients and English. This method has also the advantage of leaving uncovered every part of the limb, to which the apparatus is to be applied, and thus the assistant's hands can remain in the same position during all the time of applying whatever may be needed.

In this way the reduction takes place of itself, on employing a very little force, methodically directed, according as the fracture is displaced inward or outward. If the surgeon put his hands on the situation of the fracture, it is rather to examine the state of the ends of the broken bone than to accomplish a thing seldom required, namely, what is implied by the term coaptation.

MEANS OF MAINTAINING THE REDUCTION.

All the apparatus for a fracture being only resistances, opposed by art to the

powers causing the derangement of the broken part, it follows that the whole should act in an inverse ratio to such powers. We have seen, that these consisted; 1. Of the action of external bodies, favoured by the extreme mobility of the arm and shoulder; 2. Of the action of the latissimus dorsi, pectoralis major, and teres major, which draw inward the lower end of the fracture, or, what is more common, of the deltoid, which pulls it outward; 3. Of the contractions of the muscles of the arm, which tend to draw a little upward the said end of the fracture.

Hence, 1. to render the arm and shoulder immoveable; 2. to bring either outward, or inward, the lower end of the fracture; 3. to draw downward the same; are the three indications, which every bandage, destined for a fracture of the neck of the humerus ought to fulfil. The last object merits less attention, than the two others, because the weight of the arm is alone almost sufficient for the purpose. Desault used to employ the following apparatus for the cure of fractures of the neck of the humerus.

1. Two bandages, one about five or six ells long, the other eight or ten; both being about three finger-breadths wide. 2. Three strong splints, of different lengths, and two finger-breadths broad. 3. A linen pillow, three or four inches thick at one of its ends, terminating at the other in a narrow point, and long enough to reach from the axilla to the elbow. 4. A sling to support the fore-arm. 5. A towel to cover the whole of the apparatus.

The reduction is to be effected as above explained, and the assistants are to continue the extension. Then the surgeon is to take the first roller, which is to be wet with the aq. veg. min. and is to fix one of its heads by applying two circular turns to the upper part of the fore-arm. The bandage is now to be rolled moderately tight round the arm upward, making each turn overlap two thirds of that which is immediately below it. When the roller has reached the upper part of the limb, it must be doubled back a few times to prevent the folds, which the inequality of the part would create. The bandage is afterwards to be carried twice under the opposite axilla, and the rest of it, rolled up, is to be brought up to the top of the shoulder, and committed to the care of an assistant.

The first splint is to be placed in front, reaching from the bend of the arm as high as the acromion. The second, on the outside from the external condyle to the same height. The third, behind, from the olecranon to the margin of the axilla. The pillow, interposed between the arm and thorax, serves as a fourth splint, which becomes useless. An assistant applies these parts of the apparatus, and holds them on by applying his hands near the bend of the arm, in order not to obstruct the application of the remainder of the bandage.

The surgeon takes hold of the bandage again, and applies it over the splints with moderate tightness, and the bandage ends at the upper part of the fore-arm, where it began.

The assistants continually keeping up the extension, the surgeon is to place the pillow between the arm and trunk, taking care to put the thick end upward, if the fracture be displaced inward; but downward, if this should be displaced outward, which is most common. It is to be attached by two pins to the upper part of the roller.

The arm is to be brought near the trunk, and fixed upon the pillow, by means of the second roller, applied round the arm and thorax. The turns of this bandage should be very tight below, and rather slack above, if the fracture should be displaced inward; but, if outward, they should be slack below, and tight above.

The fore-arm is to be supported in a sling, and the whole of the apparatus is to be enveloped in a napkin, which will prevent any friction from deranging the bandages.

If we compare the effect of the above apparatus in fulfilling the indications above specified, we shall easily see, that they are very well accomplished. The arm, firmly fixed against the trunk, can only move with it, and then nothing displaces the lower end of the fracture, which is equally motionless. The shoulder cannot communicate any motion to the upper end of the fracture. The pillow, differently disposed, according to the direction, in which the lower extremity of the fracture is displaced, serves to keep this part in the opposite position.

Should this part of the bone project inward, the thick end of the pillow will remove it further from the chest. The bone will be kept at this distance from the side by the turns of the bandage, which, being very tight downward, will act upon the limb as a lever, the fulcrum for which will be the pillow, and the resistance, the action of the pectoralis major, latissimus dorsi, and teres major. Thus the bandage will have the effect of bringing the elbow nearer the trunk, and move the lower end of the fracture in the opposite direction, so that it may be here considered as an artificial muscle, directly opposing the natural ones.

When the lower end of the fracture is drawn outward, which is most commonly the case, the contrary effect will be pro-

duced, both from the pressure exercised by the bandage on the upper end of the displaced portion of the bone, and from the situation of the elbow, which is kept outward by the thick part of the pillow. The outer splint will also prevent the lower end of the fracture from being displaced outward, both by its mechanical resistance to the bone, and by compressing the deltoid muscle, which is the chief cause of the derangement in this direction. All derangement of the lower end of the fracture, forward, or backward, is prevented by the front and back splints.

All derangement, in regard to length, already prevented by the weight of the limb, is still more effectually hindered by the compression exercised on the muscles of the arm, causing such derangement both by the splints and roller. (See *Œuvres Chirurgicales de Desault, par Bichat, Tom.* 1.)

FRACTURES OF THE LOWER END OF THE OS BRACHII, WITH SEPARATION OF THE CONDYLES.

Fractures of the os brachii, with detachment of its condyles, seem to have escaped the notice of most authors, who have written on the diseases of the bones. The ancients have transmitted to us nothing upon the subject. Heister only mentions the fracture of the lower end of this bone, with a view of making an unfavourable prognosis. This accident is not uncommon, and Desault, in particular, had frequent occasion to meet with it.

Whatever the causes of this kind of fractures may be, they are commonly produced in such a way, that a longitudinal division separates the two condyles from each other, and, extending more or less upward, is bounded by another transverse, or oblique division, which occupies the whole thickness of the bone. Hence, there are three different pieces of bone, and two fractures.

Sometimes, the division is more simple. Then, taking a direction outward, or inward, it crosses obliquely downward the lower end of the os brachii, terminates in the joint, and only detaches one of the condyles from the body of the bone. The other remains continuous with it.

In the first case, the deformity is greater, and the fractured part is more moveable. When pressure is made, either before, or behind, on the track of the longitudinal fracture, the two condyles becoming further separated from each other, leave a fissure between them, and the fractured part is widened. The fore-arm is almost always in a state of pronation. On taking hold of the condyles, and moving them in different directions, a very distinct crepitus is perceived.

In the second case, the separation of the condyles from each other is not so easy; but, a crepitus can always be distinguished, on moving the detached condyle. In one case, in which the external condyle was the only one broken, Desault found the limb always supine: a position, in effecting which, the muscles inserted into this part are, doubtless, concerned.

An acute pain, the almost inevitable effect of bending, or extending, the fore-arm; the habitual half bent state of this part of the limb, and sometimes a subsequent swelling of it, together with more or less tumefaction around the joint, are observable in both kinds of cases. These accidents may also be complicated with wounds, splinters of bone, &c. when the blow has been very violent, or a pointed piece of the bone protrudes through the flesh.

PROGNOSIS.

Almost all writers consider the communication of a fracture with a joint, as a fatal kind of complication. Swelling and inflammation of the adjacent parts; continuance of pain after the reduction; large abscesses; even mortification of the soft parts, and caries of the bones, are, according to such authors, the almost inevitable consequences of these fractures, and anchylosis the most favourable termination. Paré, Petit, Heister, Duverney, all give this exaggerated picture of these accidents.

Analogous fractures of the olecranon and patella shew, that this representation is magnified beyond truth. Modern observation has dispelled the ancient doctrine of the effusion of callus in the joint, and with it one of the principal causes, assigned by authors for the symptoms they so much dread.

The communication of the cavity of the joint with the external air might be thought to have more real influence; but, this can only occur in compound fractures. Desault has often learned from experience, that the contact of air is not so dangerous, as has been supposed.

The defect in the mode of treatment was, formerly, the general cause of all the ill consequences. Desault has never seen them in his extensive practice.

REDUCTION, AND MANNER OF MAINTAINING IT.

The detached condyles, being drawn in opposite directions by the muscles of the arm and fore-arm, commonly remain unmoved between these two powers, and are

but little displaced. External force may, however, put them out of their proper situation, and they may then become displaced forward, or backward, or they may separate from each other sideways, leaving an interspace between them. The apparatus, should, therefore, resist them in these four directions, and this object is easily accomplished by means of four splints, kept on by a rolier. The two lateral splints are, in particular, necessary, when the condyles are separated from the body of the bone, with an interspace between them. If one of them be still continuous with the humerus, the splint on this side will be of less use.

There is no occasion for the apparatus to extend as high as when the arm is fractured higher up. Of what avail, in steadying the fractured part, are the circles of the bandage, applied to the body of the bone, so much above the injury? Their only utility would consist in restraining the action of the brachialis and triceps, by compressing these muscles.

On the other hand, the roller should be continued over the fore-arm, in order that the joint, according to the judicious precept of Paulus Ægineta, may correspond to the middle of the bandage, which is here firmer, than any where else. This method is also of use by producing a gentle compression on the muscles implanted into the condyles.

Desault recommends having the front and back splints flexible at their middle part, which should be applied to the bend of the arm, and elbow. (*Œuvres Chirurgicales de Desault, par Bichat, Tom.* 1.)

The detail of the reduction of the fracture, and application of the roller and splints, becomes useless after what has been said. A further account may be found in the work mentioned in the preceding paragraph.

FRACTURE OF THE FORE-ARM.

The fore-arm is much more frequently broken, than the arm, because external force operates more directly upon it, than the latter part, especially, in falls, on the hands, which are frequent accidents.—Bichat mentions, in his account of Desault's practice, that fractures of the fore-arm often held the first place in the comparative table of such cases, kept at the Hôtel-Dieu.

We know, that the fore-arm is composed of two bones, the ulna and radius. The last is much more liable to fractures, than the first one, because it is articulated with the hand by a large surface. All the shocks, received by the latter part, are communicated to the radius. The situation of this bone more immediately exposes it to such causes, as may break it; a circumstance, which we may readily convince ourselves of on the first inspection. Both bones of the fore-arm may be broken at the same time, or one alone may be fractured. One fracture has been absurdly termed complete; the other, incomplete.

FRACTURES OF BOTH BONES.

These may occur at the extremities, or middle of the fore-arm. They are frequent at the middle; very common below; but, seldom happen at the upper part of the fore-arm, where the numerous muscles, and the considerable thickness of the ulna, resist causes, which would otherwise occasion the accident. The bones are usually broken in the same line; but, sometimes, in two different directions. The fracture is almost always single; but, in some instances, it is double, and Desault, in particular, was one day called to a patient, over whose fore-arm the wheels of a cart had passed, so as to break the bones, at their middle and lower part, into six distinct portions. The middle ones, notwithstanding they were quite detached, united very well, with hardly any deformity.

These accidents are most commonly occasioned by direct external violence; but, occasionally, they are produced by a counter-stroke, which is generally the case, when the patient has fallen on his hand. But, in this instance, as the hand is principally connected with the lower broad articular surface of the radius, this bone alone has to sustain almost the whole shock of the blow, and hence is usually the only one broken.

SYMPTOMS.

It is, in general, difficult to be deceived by the symptoms, indicating fractures of the fore-arm. Motion at a part of the limb, where it was previously inflexible; a crepitus, almost always easily felt; sometimes a distinct depression in the situation of the fracture; a projection of the ends of the fracture beneath the skin, but, a less common symptom; pain produced by moving the part; a noise sometimes audible to the patient at the moment of the accident; an inability to perform the motion of pronation and supination; and an almost constant half-bent state of the fore-arm; are the symptoms, which, with the phenomena, common to all other fractures, characterize this one. These are sufficient to dispel all doubts, which immense swelling of the limb may create.

There is one case, however, in which, the fracture being very near the wrist-joint, similar appearances to those of a dislocation of this part may arise. But,

attention to whether the styloid processes, are above, or below, the deformity, will discover whether the case be a fracture, or dislocation. In a fracture the part is also more moveable, and there is a crepitus. (*Œuvres Chirurgicales de Desault, par Bichat, Tom.* 1.) As Boyer remarks, the two cases may be distinguished by simply moving the hand, by which motion, if there be a luxation without fracture, the styloid processes of the radius and ulna will not change their situation; but, if a fracture do exist, these processes will follow the motion of the hand. (*Boyer, Leçons sur les Maladies des Os, Tom.* 1.)

The connexion of the two bones of the fore-arm, by the interosseous ligament, which occupies the interspace bywhich they are separated, and the manner, in which the muscles that are attached to both, are inserted into them, render the derangement of the broken pieces in the longitudinal direction very difficult; and, in reality, a derangement in this direction has been seldom observed, and never to any considerable degree: when it does take place, it is to be ascribed to the cause of the fracture, rather than to muscular contraction. The derangement in the direction of the diameter, on the contrary, always takes place in such a manner, as that the four pieces approach one another, and the interosseous interspace diminishes, or is entirely obliterated at that part near the seat of the fracture; which approximation at the ends of the bones causes an evident deformity of the part.

To this must be added the angular deformity, which the fracturing cause always produces, either forward or backward, according to its direction.

Boyer gives the following account of the treatment of a fracture of the fore-arm, both bones being broken.

In order to adjust a fracture of these bones, the fore-arm is to be bent to a right angle with the arm, and the hand placed in a position between pronation and supination. The fore-arm and hand being thus placed, an assistant takes hold of the four fingers of the patient, and extends the fractured parts, while another assistant makes counter-extension by fixing the humerus with both his hands. By these means, the operator is enabled to restore the bones to their natural situation, and to push the soft parts into the interosseous space, by a gentle and graduated pressure on the anterior and posterior sides of the arm. Coaptation is very easy in fractures of these bones, as are indeed all the other parts of the operation, in which effort and violence are not at all required.

The fracture being thus set, the bones are kept in their place by applying first on the anterior and posterior sides of the fore-arm two longitudinal and graduated compresses, the base of which is to be in contact with the arm. The depth of these compresses should be proportioned to the thickness of the arm, increasing as the diameter of the arm diminishes. In the next place, the surgeon takes a bandage about six yards long rolled up in one, and makes three turns of it on the fractured part, descends then to the hand by circles partially placed over one another, and envelopes the hand by passing the bandage between the thumb and index: the bandage is then carried upward in the same manner, and reflected wherever the inequality of the arm may render it necessary. The compresses and bandage being thus far applied, the surgeon lays on two splints, one anteriorly, the other posteriorly, and passes the part of the bandage that yet remains over them, in such a manner as entirely to cover them. It may not be unnecessary to remark, that the compresses and splints should be of the same length as the arm. It would be useless to employ lateral splints in this case, unless (what is scarcely ever to be expected or met with) a derangement should have taken place in that direction. It is evident, that lateral splints would counteract the compresses and two other splints, by increasing the radio-cubital diameter of the arm, and by concurring with the action of the pronatores to move the pieces into the interosseous space. The surgeon's attention should be most particularly directed to preserve the interosseous space; for, if this be obliterated, the radius cannot rotate on the cubitus, nor the motion of pronation or supination be executed; and this object may be obtained with certainty by applying the compresses and splints in such a manner as that the fleshy parts may be forced into, and confined in, the interosseous space, and by renewing the bandage every seven or eight days.

If the fracture be simple, and the contusion inconsiderable, the patient need not be confined to bed; he may be allowed to walk about with his arm in a sling. (*Boyer, Leçons sur les Maladies des Os, Tom.* 1.)

OF FRACTURES OF THE RADIUS.

Of all fractures of the fore-arm, this is the most frequent. The radius being almost the sole support of the hand, and placed in the same line with the humerus, is for both these reasons more exposed to fractures, than the ulna.

Fractures of the radius, whether transverse or oblique, near its middle part or extremities, may be caused by a fall or blow on the fore-arm, or, as happens in

most cases, by a fall on the palm of the hand. When likely to fall, we extend our arms, and let the hands come first to the ground; in which case, the radius, pressed between the hand on the ground, and the humerus, from which it receives the whole momentum of the body, is bent, and, if the fall be sufficiently violent, broken more or less near its middle part. When, after an accident of this kind, pain and a difficulty of performing the motions of pronation and supination supervene, the probability of a fracture of the radius is very strong. The truth is fully ascertained by pressing with the fingers along the external side of the fore-arm. Also, in endeavouring to perform supination or pronation of the hand, a crepitus and a motion of the broken portions will be perceived, if the bone be in reality fractured. When the fracture takes place near the head of the radius, the diagnosis is more difficult on account of the depth of soft parts over the bone in that part. In this case, the thumb is to be placed under the external condyle of the os humeri, and on the superior extremity of the radius, and at the same time the hand is to be brought into the prone and supine positions. If in these trials, always painful, the head of the bone rests motionless, there can be no doubt of its being fractured. The causes of derangement are here the same as in fractures of the fore-arm, and it can never take place, except in the direction of the diameter of the bone, and is effected principally by the action of the pronating muscles. The ulna serves as a splint in fractures of the radius; and the more effectually so, as these two bones are connected with one another throughout their whole length. Notwithstanding the evident mechanism, which prevents the longitudinal derangement, J. L. Petit has thought that derangement possible. (*Boyer, Tom.* 1.)

When only the radius is fractured, no extension is ordinarily requisite. During the treatment the elbow is to be bent, and the hand put in the mid state, between pronation and supination; that is to say, the palm of the hand is to face the patient's breast. Having reduced the ends of the fracture, when they appear to be displaced, the soap plaster is to be applied, and over this a slack roller. This bandage is, indeed, of no utility; but, it makes the limb seem to the unknowing by-standers more comfortable, than if it were omitted, and, as it does no harm, the surgeon may honestly apply it. However, no one can doubt, that tight bandages may act very perniciously in fractures of the fore-arm, by pressing the radius and ulna together, causing them to grow to each other, or, at all events, making the fracture unite in an exceedingly uneven manner. Only two splints are necessary; one is to be placed along the inside, the other along the outside of the fore-arm. Soft pads must always be placed between the skin and the splints, in order to obviate the pressure of the hard materials, of which the latter are formed. The inner splint should extend to about the last joint of the fingers; but, not completely to the end of the nails; for, many patients, after having had their fingers kept, for several weeks, in a state of perfect extension, have been a very long time in becoming able to bend them again.

Sometimes, it may be proper to apply a compress just under the ends of the fracture to prevent their being depressed towards the ulna too much, the consequence of which has occasionally been the loss of the prone and supine motions of the hand.

In setting a fractured radius, the hand should be inclined to the ulnar side of the fore-arm.

OF FRACTURES OF THE ULNA.

Fractures of this bone, less frequent than those of the radius, take place generally at its lower extremity, because it is smaller and less covered at that part, than at any other. A fracture of this bone is almost always the result of a force acting immediately on the part fractured; as, for instance, when one falls and strikes the internal side of the fore-arm against a hard resisting body. On applying the hand judiciously on the inside of the fore-arm, this fracture is easily ascertained by the depression in that part, in consequence of the inferior portion being drawn toward the radius by the action of the pronator radii quadratus. This derangement is in general less, than that which takes place in fractures of the radius. The superior portion of the cubitus remains unmoved, as has been well observed by J. L. Petit.

In this case, the assistant who makes whatever little extension may be necessary, should incline the hand to the radial side of the fore-arm, while the surgeon pushes the flesh between the two bones, and applies the apparatus, as in the preceding case. In all fractures of the bones of the fore-arm, and, particularly, in those which are near the head of the radius, a false anchylosis is to be apprehended, and should be guarded against by moving the elbow gently and frequently, when the consolidation is advanced to a certain degree. (*See Boyer, Leçons sur les Maladies de Os, Tom.* 1.)

Fractures of the fore-arm always require this part to be kept quietly in a sling.

FRACTURES OF THE OLECRANON.

The ancients seem to have been little acquainted with fractures of the olecranon, on which subject they have been quite silent, unless Paulus Ægineta alludes to it in the following passage: *Cubitus frangitur.....circa partem ad cubiti gibbum.* Even most of the moderns, Petit, Duverney, Bell, &c. have not given a satisfactory account of such cases. The olecranon may be fractured either at its base, or its extremity; but, the first occurrence is the most frequent. The division is almost always transverse, though occasionally oblique. The causes, producing the accident, are, either the action of the muscles, which is a very uncommon one, or external violence, which is much more usual.

With regard to symptoms, the contraction of the triceps, being no longer resisted by being connected with the ulna, draws upward the short fragment, to which it adheres, so as to produce, between it and the lower one, a more, or less evident interspace. This interspace is found situated at the back part of the joint, and it may be increased or diminished at will, by augmenting the flexion of the fore-arm, and putting the triceps into action, or else extending the limb. Another symptom, is the impossibility of spontaneously extending the fore-arm, the necessary effect of the detachment of the triceps from the ulna. The fore-arm is constantly half-bent, the biceps, and brachialis having no antagonists. The olecranon is, more or less conspicuously, drawn up higher, than the condyles of the os brachii, which latter parts, on the contrary, are naturally situated higher, than the olecranon, when the fore-arm is half-bent. The upper piece of bone may be moved in every direction, without the ulna participating in the motion. Besides these symptoms, we must take into the account, the considerable pain experienced, the crack sometimes distinctly heard by the patient, and the crepitus frequently perceptible.

The indications are to push downward the retracted portion of the olecranon, and to keep it in this position, at the same time, that the ulna is made to meet it, as it were, by extending the fore arm. Desault says, however, it should not be completely extended, as when the pieces of bone touch at their back part, they leave a vacancy in front, which is apt to be followed by an irregular callus, prejudicial to the future free motion of the elbow. Hence, this celebrated practitioner used to put the arm between the half-bent state and extension. This posture, however, would soon be changed, if permanent means were not taken to maintain it. Desault, with this view, was in the habit of applying a splint along the fore-part of the arm. But, position evidently only operates on the lower part of the olecranon, by approximating it to the upper one. The latter requires also to be brought near the former, and fixed there, which is, doubtless, the most difficult object to effect, because the triceps is continually resisting.

Desault used to adopt the following method: the fore-arm being held in the above position, the surgeon is to begin applying a roller round the wrist, and to continue it as high as the elbow. The skin, covering this part, being wrinkled in consequence of the extension of the limb, might insinuate itself between the ends of the fracture, and consequently it must now be pulled upward by an assistant. The surgeon is then to push the olecranon towards the ulna, and confine it in this situation with a turn of the roller, with which the joint is then to be covered, by applying it in the form of a figure of 8.

A strong splint, a little bent, just before the elbow, is next to be laid along the arm and fore-arm, and fixed by means of a roller. The apparatus being applied, the whole limb is to be evenly supported on a pillow.

It is calculated, that, on an average, the olecranon becomes firmly united about the twenty-sixth day. (*Desault par Bichat.*)

FRACTURES OF THE FINGERS.

On this subject, we need only remark, that the treatment consists in applying a piece of soap-plaster, rolling the part with tape, incasing it in pasteboard, sometimes placing the hand on a flat splint, or finger-board, and always keeping the hand, fore-arm, and elbow, well supported in a sling.

For Fractures of the Cranium, see *Head, Injuries of.*

For information on fractures consult particularly, *Petit's Traité des Maladies des Os; Duverney's Traité des Maladies des Os; W. Sharp in vol. 57. of the Philosophical Trans. part* 2, 1767. *Pott's Remarks on Fractures and Dislocations. Cases in Surgery by C. White, F. R. S. Edit.* 1770. *Boyer's Leçons sur les Maladies des Os, redigées en un Traité complet de ces Maladies, par Richerand, or the English Translation by Dr. Farrell; Encyclopédie Methodique, Partie Chirurgicale, Art. Fracture, Cuisse, Omoplate, Ilium, &c. &c. Œuvres Chirurgicales de Desault, par Bichat, Tom.* 1. *Parts of the Parisian Chirurgical Journal. Richerand's Nosographie Chirurgicale, Tom.* 3,

Edit. 2. *Levéillé's Nouvelle Doctrine Chirurgicale, Tom.* 2, 1812.

FRÆNUM LINGUÆ. (from *fræno*, to curb.) Occasionally it happens, in infants that their tongues are too closely tied down, by reason of the frænum being too short, or continued too far forwards towards the point. In the latter case, the child will not be able to use its tongue, with sufficient ease in the action of sucking, swallowing, &c. in consequence of the point being too much confined at the bottom of the mouth. Though this affection, however, is not unfrequent, yet, it is much less common, than it is generally supposed to be by parents and nurses. When the child is small, and the nurse's nipple large, it is common for her to suppose the child to be tongue-tied, when, in fact, it is only the smallness of the child's tongue, that prevents it from surrounding the nipple, so as to enable it to suck with facility. Mothers also commonly suspect the existence of such an erroneous formation whenever the child is long in beginning to talk.

The reality of the case may always, however, be easily ascertained by examining the child's mouth. In the natural state, the point of the tongue is always capable of being turned upward towards the palate, as the frænum does not reach along about a quarter of an inch of the lower part of the tongue from the apex. But, in tongue-tied children, by looking upon one side, we may see the frænum extending from the back part to the very point, so that the whole length of the tongue from the back part to the very point, is tied down, and unnaturally confined in its motion.

The plan of cure is to divide, as much of the frænum as seems proper for setting the tongue at liberty. The incision, however, should not be carried more extensively backward, than is necessary, lest the ranial arteries should be cut; an accident, that has been known to have proved fatal. For the same reason, the scissars, used for this operation, should have no points. I think the following piece of advice, offered by a modern author, may be of service to practitioners, who may find it necessary to divide the frænum linguæ: "It is not the relations of the trunk of the lingual artery alone, which the student ought to make himself acquainted with. He will do well to study the position of the arteria ranina in respect to the frænum linguæ. This information will teach him the impropriety of pointing the scissars upward and backward, when snipping the frænum, an operation bye the bye, oftener performed, than needed. He will learn, that the ranular artery lies just above the attachment of the frænum; so that if he would avoid it, he must turn the points of the scissars rather downward; if he do not, the artery will probably suffer." (*A. Burns on the Surgical Anatomy of the Head and Neck, p.* 239.)

When an infant has the power of sucking, this proceeding should never be resorted to, even though the frænum may have the appearance of being too short, or extending too far forwards. (*Fab. Hildanus, centur* 3. *Obs.* 28; *Petit, Traité des Maladies Chirurgicales, Tom.* 3, *p.* 265, *Edit.* 1774.)

Although the operation of dividing the frænum linguæ is for the most part done without any bad consequences, surgeons should remember well, that it is liable to dangers, especially, when performed either unnecessarily, or unskilfully.

Besides the fatal events, which have occasionally resulted from wounding the ranial arteries, the records of surgery furnish us with proofs, that the mere bleeding from the ranial veins, and the small vessels of the frænum may continue so long, in consequence of the infants' incessantly sucking, as to produce death. In such cases the child swallows the blood, as fast as it issues from the vessels, so that the cause of death may even escape observation. But, if the body be opened, the stomach and intestines will be found to contain large quantities of blood. (See *Dionis, Cours d'Operations de Chirurgie, 7e Demonstration; and Petit's Traité des Maladies Chirurgicales, Tom.* 3, *p.* 282, *&c.*)

Another accident, sometimes following an unnecessary, or too extensive a division of the frænum, consists in the tongue becoming thrown backward over the glottis into the pharynx, where is lies fixed, and causes suffocation. The observations of Petit on this subject are highly interesting. (See *Op. cit. Tom.* 3, *p.* 267, *&c.*)

Lastly, it should be known, that an infants' inability to move its tongue, or suck, is not always owing to a malformation of the frænum. Sometimes the tongue is applied and glued, as it were, to the roof of the mouth, by a kind of mucous substance, and in this case, it should be separated with the handle of a spatula. By this means infants have been saved, which were unable to suck during several days, and were in imminent danger of perishing from want of nourishment. (See *Mémoires de l'Acad. de Chirurgie, Tom.* 3. *p.* 16, *Edit.* 4*to.*)

See particularly *Petit's Traité des Maladies Chirurgicales, Tom.* 3, *p.* 260, *&c. Dionis Cours d' Opérations, 7e Demonstr. Sabatier's Médecine Opératoire, Tom.* 3, *p.* 132, *&c. Lassus, Pathologie Chirurgicale, Tom.* 2, *p.* 454. *Richerand's Nosographie Chirurgicales, Tom.* 3. *p.* 284, *Edit.* 2.

Richter's Anfangsgrunde des Wundarzney-kunst, Band. 4, *Kap.* 2, *p.* 11. *Edit.* 1800.

FRAGILITAS. (from *frango*, to break.) *Fragilitas Ossium.* A morbid brittleness of the bones. The gelatinous part of the bones, to which they owe their flexibility, may be so deficient in them, that they are capable of being broken by the slightest causes. The state of a bone, thus distempered, may be well conceived, from that of a calcined one.

Boyer imputes the *mollities ossium* to a deficiency of lime in their structure; the *fragilitas ossium* to a deficiency of the soft matter naturally entering into the texture of these parts. He states that a certain degree of the fragilitas ossium necessarily occurs in old age, because the proportion of lime in the bones naturally increases as we grow old, while that of the organized part diminishes. Hence it is, that the bones of old persons more easily break, than those of young subjects, and that they are longer in uniting again.

In persons, who have long been afflicted with cancerous diseases, the bones are said occasionally to become as brittle, as if they had been calcined. Saviard and Louis relate such cases. The latter mentions a nun, who broke her arm by merely leaning on a servant; and in the London Medical Journal an account is given of a person, who could not even turn in bed, without breaking some of his bones.

The bones are said sometimes to be remarkably brittle in the latter stages of syphilis.

In bad cases of scurvy, the bones occasionally become so brittle, as to be broken by the slightest causes, and do not grow together again.

The fragilitas ossium of old age is incurable: that which depends on some other constitutional disease can only be relieved by a removal of the latter. (See *Boyer on Diseases of the Bones, Vol.* 2.)

FUMIGATION. (from *fumigo.*) *Fumigatio.* In surgery, means any application in the form of a steam, or vapour.

FUNGUS. (from σφογγος, a sponge.) Any sponge-like excrescence. Granulations are often called *fungous* when they are too high, large, flabby, and unhealthy.

FUNGUS HÆMATODES. (from *fungus*, and αιμα, blood. *The Bleeding Fungus. Spongoid Inflammation. Soft Cancer. Carcinome Sanglante.*

This disease has only been accurately described of late years, having before been generally confounded with cancer. The public are indebted to Mr. Burns, of Glasgow, for the first good account of it; and the subsequent publications of Mr. Hey, of Leeds, Mr. Freer, of Birmingham, and Mr. J. Wardrop, have made us still better acquainted with the subject.

It is perhaps one of the most alarming diseases, incidental to the human body, because, we know of no specific remedy for it; and an operation can only be useful at a time, when it is very difficult to persuade a patient to submit to it.

Fungus Hæmatodes, is the name applied to it by Mr. Hey. Mr. Burns has called it *spongoid inflammation*, from the spongy elastic feel, which peculiarly characterizes it, and which continues even after ulceration takes place. The fungus hæmatodes has most frequently been seen to attack the eyeball, the upper and lower extremities, the testicle, and the mamma. But, the uterus, ovary, liver, spleen, lungs, thyroid gland, hip and shoulder joints, have been the seat of the disease. A distemper, which presents itself in so many parts, must be subject to variety in its appearances.

Fungus Hæmatodes of the Eye.

1. When it attacks the eye, the first symptoms are observable in the posterior chamber. The pupil becomes dilated and immoveable, and, instead of having its natural deep black colour, it is of a dark amber, and sometimes of a greenish hue. The change of colour becomes gradually more and more remarkable, and, at length, is discovered to be occasioned by a solid substance, which proceeds from the bottom of the eye towards the cornea. The surface of this substance is generally rugged and unequal, and ramifications of the central artery of the retina may sometimes be seen running across it. The front surface of the new mass, at length, advances as far forwards as the iris, and the amber, or brown appearance of the pupil, has, in this stage, been known to mislead surgeons into the supposition of there being a cataract, and make them actually attempt couching. The disease continuing to increase, the eyeball loses its natural figure, and assumes an irregular knobby appearance. The sclerotica also loses its white colour, and becomes of a dark blue, or livid hue. Sometimes, matter now collects between the tumor and the cornea. The latter membrane in time ulcerates, and the fungus shoots out. In a few instances, it makes its way through the sclerotica, and is then covered by the conjunctiva. The surface of the excrescence is irregular, often covered with coagulated blood, and bleeds profusely from slight causes. When the fungus is very large, the most prominent parts slough away, attended with a fetid sanious discharge. In the course of the disease the absorbent glands, under the jaw, and about the parotid gland, become contaminated. On dissection, a diseased

mass is found extending forwards from the entrance of the optic nerve, the vitreous, crystalline, and aqueous humours being absorbed. The retina is annihilated, and the choroid coat propelled forwards, or quite destroyed. The tumour seems to consist of a sort of medullary matter, resembling brain. The optic nerve is thicker and harder than natural, of a brownish ash-colour, and destitute of its usual tubular appearance. In other cases, the nerve is split into two or more pieces, the interspaces being filled up with the morbid growth. Even the brain has been observed to share in the disease, sometimes dark-red spots appearing on the dura matter; sometimes small spots, containing a fluid-like cream, being found between the pia mater and tunica arachnoides. When the lymphatic glands are enlarged, they are also found converted into a kind of medullary matter, similar to that which composes the diseased mass in the eyeball. When the skin bursts over a diseased absorbent gland, a sloughy ulcer is produced; but, no fungus is emitted, unless the affection of the gland with fungus hæmatodes be primary. Fungus hæmatodes of the eye has been erroneously regarded as cancer by the best writers. We learn from Bichat, that more than one-third of the patients on whom Desault operated for *supposed* carcinoma of the eye, were under twelve years of age. Twenty, out of twenty-four cases of fungus hæmatodes of the eye, with which Mr. Wardrop has been acquainted, happened to children under twelve years of age. Now, as cancer is rather a disease of aged, than young persons, and we find, from Mr. Wardrop, that fungus hæmatodes of the eye mostly affects persons under twelve years of age, it is tolerably certain, that most of Desault's cases, reported to be cancers of the eye, were in fact the equally terrible malady now engaging our consideration. The sight of young subjects is generally destroyed, before the attention of parents is excited to the distemper. Frequently, however, a blow, followed by ophthalmy, precedes the growth of the diseased mass. When no external violence has occurred, the first symptom is a trivial fulness of the vessels of the conjunctiva, the iris becoming, at the same time, extremely vascular, and altered in colour, and the pupil dilated and immoveable. There is seldom much complaint made of pain; but, the child is sometimes observed to be languid and feverish. In adults, the fungus hæmatodes of the eye generally comes on without any apparent cause, though sometimes in consequence of a blow. At first, the tunica conjunctiva is slightly reddened, and vision indistinct. The redness and obscurity of sight increase slowly, and an agonizing nocturnal headach is experienced, the eye bursts, and the humours are discharged.

With regard to the cure of the fungus hæmatodes of the eye, the only chance of effecting this desirable object depends upon the early extirpation of the diseased organ. It must be acknowledged, however, that most of the operations, in which the morbid eye has been removed, have hitherto proved unsuccessful, owing to a recurrence of the disease. The reason of such ill success may be imputed to the optic nerve being almost always in a morbid state, before an attempt is made to remove the eye. The operation has always been found to fail, when the disease is advanced so far, that the posterior chamber is filled by the fungous mass. Since no internal medicines, nor external applications, afford the least hope of checking any form of the fungus hæmatodes, it is manifest, that, when the distemper of the eye exceeds certain bounds, the miserable patient is placed beyond the reach of any effectual aid from surgery. (See particularly *Wardrop's Observations on Fungus Hæmatodes.*)

Fungus Hæmatodes of the Limbs.

2. In the extremities the disease begins with a small colourless tumour, which is soft and elastic, if there be no thick covering over it, such as a fascia; but otherwise is tense. At first, it is free from uneasiness; but, by degrees, a sharp acute pain darts occasionally through it, more and more frequently, and, at length, becomes incessant. For a considerable time, the tumour is smooth and even; but, afterwards, it projects irregularly at one, or more points; and the skin at this place becomes of a livid red colour, and feels thinner. In this situation, it easily yields to pressure, but instantly bounds up again. Small openings now form in these projections, through which is discharged a thin bloody matter. Almost immediately after these tumours burst, a small fungus protrudes, like a papilla, and this rapidly increases, both in breadth and height, and has exactly the appearance of a carcinomatous fungus, and frequently bleeds profusely. The matter is thin, and exceedingly fetid, and the pain becomes of the smarting kind. The integuments, for a little way round these ulcers, are red, and tender. After ulceration takes place, the neighbouring glands swell, and assume exactly the spongy qualities of the primary tumour. If the patient still survive the disease in its present advanced progress, similar tumours form in other parts of the body, and the patient dies hectic.

After death, or amputation, the tumour is found to consist of a soft substance, somewhat like the brain, of a greyish co-

lour, and greasy appearance, with thin membrane-like divisions running through it, and cells, or abscesses, in different places, containing a thin bloody matter, occasionally in very considerable quantity. There does not seem uniformly to be any entire cyst, surrounding the tumour; for, it very frequently dives down betwixt the muscles, or down to the bone, to which it often appears to adhere. The neighbouring muscles are of a pale colour, and lose their fibrous appearance, becoming more like liver, than muscle. The bones are always carious in the vicinity of these tumours.

The distemper is sometimes caused by external violence, though in general there is no evident cause whatever. (*Dissertations on Inflammation by J. Burns, Vol.* 2.)

Mr. Hey has given several cases of the fungus hæmatodes. If we notice the most particular circumstances, relative to one of these, it will suffice to inform our reader of the form, in which this terrible affliction has presented itself in this gentleman's practice.

A young man, aged twenty-one, two years before applying to Mr. Hey, perceived a small swelling on the inside of the right knee, not far from the patella. This tumour was moveable, and did not impede the motion of the joint: it was not discoloured, but was painful, when moved, or pressed upon. It continued in this state half a year, and then the man, having hurt his knee against a stone, it gradually increased in bulk, but did not exceed the size of an egg. The skin was now discoloured with blue specks, which were taken to be veins. He could still walk with ease, and follow his business.

Two months before his admission into the Leeds Infirmary, he met with a fall, and violently bent his knee, but did not strike it against any thing. The tumour began immediately to enlarge; and, within a few hours, it extended half way up the inside of his thigh. About a fortnight after this accident, the skin burst at the lowest part of the tumour, and discharged some blood. A dark-coloured fungus, about the size of a pigeon's egg, here made its appearance, and, a few weeks afterwards, the skin burst at another part of the large tumour, and some blood was again discharged. From the fissure arose another fungus, which had increased, in the course of the last week, to the size of a small melon, and now measures eight inches from one side of its base to the other. The base of the fungus frequently bled, especially, when the man allowed his limb to hang down.

The whole tumour was now of an enormous size, being nineteen inches across, when the measure was carried over the last-mentioned fungus. From its highest part in the thigh to the lowest part, just below the knee, it measured seventeen inches, without including the fungus. The base of the tumour at the knee, exclusive of that part, which ran up the thigh, measured twenty-four inches in circumference. The tumour was situated on the inner side of the limb, and was distinctly defined. The skin, covering the disease, was in some places livid, and had several fissures and small ulcerations upon it; but, had not burst asunder, except in the two places above described. The tumour was soft, and gave a sensation of some contained fluid, when gently pressed with the hands alternately in opposite directions. The patient said he had walked without pain in his knee, a week before his admission into the Infirmary; he had lost very little blood in his journey to Leeds. He complained of the greatest uneasiness in the highest part of the tumour. It had become hot and painful in the night-time, for some days past. His pulse was 114 in a minute; his tongue was clean; and his appetite had been good, till the last few days. He had never felt any pulsation in the tumour.

In a consultation it was determined, that the tumour should be laid open, by cutting off a portion of the distended integuments; and that after removing the contents, if the sac should be found in a sound state, the disease should be treated as a simple wound; but, if in a morbid state, amputation of the limb should be immediately performed.

A large oval piece of the integuments being removed, the tumour was found to contain a very large quantity of a substance, not much unlike coagulated blood; but more nearly resembling the medullary part of the brain in its consistence and oily nature. It was of a variegated reddish colour, in some parts approaching to white, and, as blood issued from it, Mr. Hey conceived it was organized. This mass was partly diffused through the circumjacent parts in innumerable pouches, to which it adhered, and was partly contained in a large sac of an aponeurotic texture, which was connected with the capsule of the kneejoint. There was a great and universal effusion of blood from the internal surface of the sac, and from the pouches, containing this morbid mass.

Amputation of the limb was immediately performed, on finding such to be the nature of the case. Mr. Hey, unfortunately, however, left a portion of the diseased surface behind on the inner part of the thigh, and hoping, that a small narrow portion of the upper part of the

sac would soon become a clean sore, and not impede the cure, he made the circular incision two inches below its higher part.

On examining the amputated limb, the vastus internus was found to be brown, and much softer, than the other muscles, which were healthy. There were many small portions of blood extravasated in the substance of this muscle. The sac was formed of the aponeurotic covering of the muscle, and ended below where this aponeurosis begins to cover the capsular ligament of the knee. The two fungous substances, above described, appeared to have been only extensions of the morbid mass, where this had made its way through the sac and the integuments. The joint of the knee, and muscles of the leg, were perfectly sound.

I need not detail all the particulars after the operation. Suffice it to say, the man suffered a great deal of constitutional disorder. After a few weeks, the granulations upon the stump became good, and the cicatrization was nearly completed at the end of the sixth week, after the amputation. At this period, that small and superficial portion of the upper part of the great sac, which Mr. Hey had unfortunately left, was now healed; but, a tumour, now about four inches in length, and between two and three in breadth, had gradually risen at the lower and under part of the thigh, beneath the cicatrix. This contained a soft substance, exactly similar, as far as the touch could discover, to that which had filled the large sac. This tumour became painful, and sometimes discharged a bloody serum, sometimes dark-coloured blood, through four or five, small openings in the cicatrix.

Mr. Hey laid open the tumour, and removed its contents; but no advantage was gained by this proceeding. The interior surface was found to be too much diseased to produce good granulations. Blood continued to ooze out of the wound for a few days. Then the inner surface became covered with a blackish substance, which gradually extended itself, and formed a new fungus. A variety of escharotics were applied to destroy the fungus and morbid surface of the wound; but, to no purpose, the growth of the fungus always exceeded the quantity destroyed. Undiluted oil of vitriol, applied freely, had very little effect.

An attempt was once more made to cut away the disease; but, on examining the wound carefully, after the contained substance was removed, the muscular substance was found degenerated into a hard mass, which felt somewhat like cartilage. The adipose membrane was also diseased, and formed into large cells, which had contained the fungous substance. Hence, another amputation seemed the only resource.

After this operation, the whole surface of the stump seemed sound, except the principal artery, which was filled with a somewhat stiff matter, resembling coagulated blood, which prevented its bleeding. The inside of the vessel, on being touched with the scalpel, felt hard, and communicated a sensation, like that of scraping bone.

The man was sent home, as soon as his state would admit of it; but, he died consumptive about six months afterwards. Besides this instance, in the thigh, Mr. Hey relates cases of fungus hæmatodes, situated in the female breast, in the leg, in the neck (extending from the jaw to the clavicle, and producing suffocation), on the back part of the neck, on the back part of the shoulder, and at the extremity of the fore-arm, near the wrist.

"If I do not mistake, (says Mr. Hey,) this disease not unfrequently affects the globe of the eye, causing an enlargement of it, with the destruction of its internal organization. If the eye is not extirpated, the sclerotis bursts at the last, a bloody sanious matter is discharged, and the patient sinks under the complaint." (*P.* 283.)

Besides some cases, in similar situations, to those mentioned by Mr. Hey, one is related by Mr. Burns, in which the hip-joint was the seat of this terrible affection. After detailing the progress of the case to the poor man's death, this author states, that he found, on dissection, the hip-joint completely surrounded with a soft matter, resembling the brain, inclosed in thin cells, and here and there cells full of thin bloody water; the head of the thigh-bone was quite carious, as was also the acetabulum. The muscles were quite pale, and almost like boiled liver, having completely lost their fibrous appearance, and muscular properties. The same sort of morbid mischief was also found within the pelvis, most of the inside of the bones, on the affected side, being quite carious. An attempt had been made, before the patient died, to tap the bladder; but, the trocar had only entered a cell, filled with bloody water, and situated in a mass of the soft brain-like substance.

We have already said enough, to render the description of the dreadful nature of the fungus hæmatodes tolerably complete. Little can be said of the treatment; for, we know of no one medicine, that seems to have the least power of putting a stop to the disease, and we have no reason to believe, that there is ever the smallest chance even of any spontaneous amendment, much less of such a cure.

We have seen, that when the chief part of a fungus hæmatodes is cut away, and only a small portion of its cyst is left behind, that the fungus is reproduced from this part, and soon becomes as formidable, nay more formidable, than it was before, and this notwithstanding the application of the most powerful escharotics. Neither the hydrargyrus nitratus ruber, the hydrargyrus muriatus, the antimonium muriatum, nor the undiluted vitriolic acid, have always been able to repress the growth of such fungus. (*Hey*).

There is no remedy, that has the power of checking, or removing the complaint. Friction, with anodyne balsams, sometimes gives relief in the early stages; but, it does not seem to retard the progress of the disease.

In short, the only chance of cure consists in extirpating the whole of the distempered parts, removing not only the soft, brain-like, fungous substance, but every particle of the cysts, sacs, or pouches, in which it may be contained. An operation of this kind, however, is only advisable in the early stages, while the disease is entirely local; for, after the neighbouring glands have become affected, the chance of recovery is almost destroyed. It is sometimes difficult, however, to persuade patients at this time to submit to amputation, or extirpation, because the pain and inconveniences are inconsiderable; but, the operation ought to be urged with all the force, which a conviction of its absolute necessity, and, the fatal peril of delay, ought to inspire.

The attempts to cure the disease, by cutting it away, have been attended with such ill-success, that some surgeons deem it advisable not to follow this method, but amputate the limb at once. The annexed views of the matter appear to me to be most judicious and rational. First, that if an attempt be made to cut away the tumour, and save the limb, the surgeon must be careful to remove, at the same time, a considerable quantity of the soft parts in the circumference of the swelling. Secondly, that the earlier this is done, the more likely is it to succeed. Thirdly, that, after the tumour is taken out, an attentive examination of the surface of the wound should be made, and every suspicious part, or fibre, be cut away. Fourthly, that, should the disease still recur, amputation ought to be instantly performed. Fifthly, that caustics should never be applied to this disease. Sixthly, that, even when one of these operations effectually extirpates the distemper of the limb, the patient's entire recovery is always rendered exceedingly uncertain, by reason of the viscera, and other invisible parts, being frequently affected, at the time of the operation, with the same sort of disease.

FUNGUS HÆMATODES OF THE TESTICLE.

3. Fungus hæmatodes of the testicle sometimes begins in its glandular part, sometimes in the epididymis. Its progress is slow, and the pain generally not severe. Nor is there, at first, any inequality, or hardness, of the diseased part, nor change in the scrotum. When the testicle has become exceedingly large, it feels remarkably soft and elastic, as if it contained a fluid. Hence, the case has often been mistaken for an hydrocele, and punctured with a trocar. (*Wardrop.*) Occasionally, when the tumour is large, it is in some places hard, in others soft. The hydrocele may be known by the water beginning to collect at the bottom of the scrotum, and then ascending towards the spermatic cord, and by the swelling being circumscribed towards the abdominal ring; whereas the fungus hæmatodes begins with a gradual enlargement of the testicle itself, followed by a fulness, which extends up the spermatic cord. As the disease advances, abscesses form, and the scrotum ulcerates; but no fungus shoots out. When the inguinal glands become contaminated, they often acquire an immense size; and, when the skin over them bursts, large portions of them slough away. Fungus hæmatodes of the testicle is said to afflict young subjects more frequently than old ones. On dissection, the substance of the diseased testicle is found to present a medullary, or pulpy appearance, generally of a pale brownish colour, though sometimes red. In most cases, the tunica vaginalis and tunica albuginea are adherent together; occasionally, there is fluid between them. The only chance of a cure must be derived from a very early performance of castration, before the disease has extended to the inguinal glands, or far up the spermatic cord.

We shall quit this subject with stating some of the principal differences between two diseases, which have been commonly confounded. A scirrhous tumour is, from its commencement, hard, firm, and incompressible, and is composed of two substances: one hardened and fibrous, the other soft and inorganic. The fibrous matter is the most abundant, consisting of septa, which are paler than the soft substance between them. A scirrhous tumour, situated in a gland, is not capable of being separated from the latter part, so much are the two structures blended. A scirrhus, in another situation, sometimes condenses the surrounding cellular substance, so as to form a

kind of capsule, and assume a circumscribed appearance. When a scirrhous swelling ulcerates, a thin ichor is discharged, and a good deal of the hard fibrous substance is destroyed by the ulceration; other parts become affected, and the patient dies from the increased ravages of the disease, and its irritation on the constitution. Sometimes, though not always, after a scirrhus has ulcerated, it emits a fungus of a very hard texture. Such excrescence, however, is itself at last destroyed by the ulceration. Cancerous sores, also, frequently put on, for a short time, an appearance in some places of cicatrization. On the other hand, the fungus hæmatodes, while of moderate size, is a soft elastic swelling, with an equal surface, and a deceitful feel of fluctuation. It is, in general, quite circumscribed, being included within a capsule. The substance of the tumour, instead of being for the most part hard, consists of a soft, pulpy, medullary matter, which readily mixes with water. When ulceration occurs, the tumour is not lessened by this process, as in scirrhus; but a fungus is emitted, and the whole swelling grows with increased rapidity. Cancerous diseases are mostly met with in persons of advanced age, while fungus hæmatodes generally afflicts young subjects. (*Wardrop.*)

See *Dissertations on Inflammation, by J. Burns, Vol. 2. Hey's Practical Observations in Surgery. Freer on Aneurism, and particularly Observations on Fungus Hematodes, or Soft Cancer, by James Wardrop, Edinb.* 1809. *In the third volume of the Medico-Chirurgical Transactions, about to be published, I believe, some further interesting cases of fungus hæmatodes will be laid before the public.*

A case of this disease is related in Vol. 5, of the London Medical Journal. It was the consequence of an attempt to cure a ganglion by means of a seton, and it proved fatal. A case is also related by Mr. Abernethy in Surgical Observations, 1804, *p.* 99.

The medullary sarcoma, which is considered by Mr. Wardrop, as the same affection as the fungus hæmatodes, is described in the article, *Tumours.*

FURUNCULUS. (from *furo*, to rage.) A boil, so named from the violence of the heat and inflammation attending it.

A boil is a circumscribed, very prominent, hard, deep-red, inflammatory swelling, which is exceedingly painful, and commonly terminates in a slow and imperfect suppuration. The figure of the tumour is generally that of a cone, the base of which is considerably below the surface. Upon the most elevated point of the boil, there is usually a whitish, or lived pustule, which is exquisitely sensible, and immediately beneath this is the seat of the abscess. The matter is mostly slow in forming, is seldom very abundant, never healthy, at first, being always blended with blood. The complaint is seldom attended with fever, except, when the tumour is very large, situated on a sensible part, or when several of these swellings occur at the same time in different places. In the last circumstance, they often occasion in children, and even in irritable adults, restlessness, loss of appetite, spasms, &c. They rarely exceed a pigeon's egg in size, and they may originate on any part of the body.

Boils commonly arise from constitutional causes. Young persons, and, especially subjects of full plethoric habits, are most subject to them. The disease is also observed to occur with most frequency in the spring. (*Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 16.) According to Richerand, the origin of boils depends upon a disordered state of the gastric organs. (*Nosographie Chirurgicale, Tom.* 1, *p.* 124, *Edit.* 2.)

The suppuration that attends a boil, is never perfect, and the matter, which forms, is not only tinged with blood, but surrounded with a sloughy substance, which must generally be discharged, before the part affected will suppurate kindly, and the disease end. Richter compares the slough with a kind of bag, or cyst, and the whole boil with an inflamed encysted tumour.

The best plan is mostly to endeavour to make boils suppurate, as freely as possible, by applying external emollient remedies. This seems to be the natural course of the disease in its progress to a cure, and, indeed, all endeavours to discuss furunculous tumours commonly fail, or succeed very imperfectly; only removing the inflammation, and leaving behind an indolent hardness, which occasions various inconveniences, according to its situation, every now and then inflames anew, and never entirely disappears, until a free suppuration has been established.

In a very few cases, perhaps, it may be proper to try to discuss boils. For this purpose, besides bleeding, gentle evacuations, and a low diet, which are requisite in this, as well as other local inflammations, some prescribe as external applications honey strongly acidulated with sulphuric acid; alkohol; or camphorated oil.

But, in the generality of instances, suppuration must be promoted, by the use of emollient poultices. The tumour, when allowed to burst, generally does so at its apex. However, as the opening, which spontaneously occurs, is generally long in forming, and too small to allow the sloughy cellular substance to be dis-

charged, it is always best, as soon as matter is known to exist in the tumour, to make a free opening with a lancet, and immediately afterwards to press out as much of the matter and sloughs, as can be prudently done. This having been accomplished, and the rest of the sloughs pressed out, as soon as it is practicable, healthy pus will be secreted, and the part will granulate and heal. Until the suppuration becomes of the healthy kind, and the sloughy substances are entirely discharged, an emollient linseed poultice is the best application, and when granulations begin to fill up the cavity, plain lint, and a simple pledget, are the only dressings necessary.

Where there is reason to suppose the gastric organs to be in a disordered state, an emetic should be given in the early part of the treatment, and afterwards small repeated doses of any of the mild purging salts.

When an indolent hardness continues, after the inflammatory, and suppurative state of boils has been cured, the part should be rubbed with camphorated mercurial ointment.

Besides the above *acute* boil, authors describe a *chronic* one, which is said frequently to occur, in subjects, who have suffered severely from the small-pox, measles, lues venerea, scrofula, and in constitutions, which have been injured by the use of mercury.

The *chronic* boil is commonly situated upon the extremities, is of the same size as the acute one, has a hard base, is not attended with much pain, nor any considerable discolouration of the skin, until suppuration is far advanced, and the matter is seldom quite formed, before three, or four weeks. This, like the former, sometimes appears in a considerable number at a time. The discharge is always thinner, than good pus, and when the boil is large, and has been long in suppurating, a great deal of sloughy cellular membrane must be cast off, before the sore will heal.

The principal thing, requisite in the local treatment of all furunculous, and carbuncular tumours, is to make an early free opening into them, and to press out the matter and sloughs, employing emollient poultices, till all the mortified parts are detached and removed, and afterwards simple dressings. (See *Pearson's Principles of Surgery. Richter's Anfangsgrunde der Wundarzn. Band.* 1. *Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 15. *Richerand Nosographie Chirurgicale, Tom.* 1, *p.* 123, *Edit.* 2.)

G.

GANGLION, (γαγγλιον.) In anatomy, a knot in the course of a nerve; in surgery, a tumour on a tendon, or aponeurosis.

A ganglion is an encysted, circumscribed, moveable swelling, commonly free from pain, causing no alteration in the colour of the skin, and formed upon tendons in different parts of the body, but, most frequently, upon the back of the hand, and over the wrist. A French gentleman consulted me some time ago, who had one upon the upper part of his foot, which created a great sensation of weakness in the motion of the foot, and I have taken notice, that ganglions occur particularly often just below the kneepan, in housemaids, who are in the habit of kneeling a great deal in order to scour rooms. It is curious to remark, that pressure, which is the best common means of getting rid of ganglions, in this instance, appears to act as a cause.

These tumours, when compressed, seem to possess considerable elasticity. They often occur unpreceded by any accident; frequently, they are the consequence of bruises and violent sprains. They seldom attain a considerable size, and ordinarily are not painful, though every now and then there are instances to the contrary. When opened, they are found to be filled with a viscid transparent fluid, resembling white-of-egg. If they do not disappear of themselves, or are not cured, while recent, by surgical means, they, in some cases, become so large, that they cause great inconvenience, by obstructing the motion of the part, and rendering it painful.

Discutient applications sometimes succeed in curing ganglions, and, in this country, friction with the oleum origani is a very common method. I have often seen such tumours very much lessened by this plan of treatment, but seldom cured, and, no sooner has the friction been discontinued, than the fluid in the cyst has in general accumulated again.

Compression is usually more effectual, than discutient liniments. Persons with ganglions have been recommended to rub them strongly with their thumb, several times a day. After this has been repeated very often, the tumour is said sometimes to have absolutely disappeared

while the friction was employed. But, the best method is to make continual pressure on ganglions, by means of a piece of sheet-lead, bound upon the part with a bandage. There is no objection, however, to using once, or twice a day, in conjunction with this treatment, frictions with the oleum origani, or camphorated mercurial ointment, provided these measures together do not seem likely to make the tumour inflame, an event, which should always be carefully avoided. Ganglions, when irritated too much, have been known to become most malignant diseases.

Setons have been recommended to be introduced through ganglions, with a view of curing them. This method, however, is not an eligible one, for, it is by no means free from danger, as the records of surgery fully shew. Cancerous diseases, and even the fungus hæmatodes (*Med. Journal, Vol. 5.*) have arisen from the irritation of a seton passed through a ganglion.

Frequently, when a ganglion inflames, and ulcerates, the cyst throws out a fungus, which is of a very malignant nature. Hence, the practitioner should avoid making an opening into the swelling, or doing any thing, which is likely to occasion sloughing, or ulceration of the disease. Ganglions may be cured by pressure, of such force, as to rupture the cyst, and some authors have recommended putting the hand affected upon a table, and then striking the ganglion several times with the fist, or a mallet. The cyst of a recent ganglion may also be burst, by compressing it strongly with the thumbs, with or without the intervention of a piece of money; the fluid is effused into the adjacent cellular membrane; and, pressure being now employed, the opposite sides of the cavity become united by the adhesive inflammation, and the recurrence of the disease is prevented. (See *L'Encyclopédie Méthodique, Partie Chirurgicale, art. Ganglion*; *Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 400, *&c.*; *Levéillé, Nouvelle Doctrine Chirurgicale, Tom.* 3, *p.* 7.)

In almost every instance, a ganglion may be cured by pressure and friction, and, if not actually cured, the disease may be rendered so bearable by these means, that few patients would choose to have the tumour cut out. Under this plan, the swelling becomes very much diminished, and, should it enlarge again, the mode of relief is so simple, and the case so little troublesome, that patients generally content themselves with every now and then wearing a piece of lead on the part.

But when ganglions resist all attempts to disperse, or palliate them; when they become extremely inconvenient, either by obstructing the functions of a joint, or causing pain; these tumours should be carefully dissected out, by first making a longitudinal incision in the skin covering them, then separating the cyst on every side from the contiguous parts, and lastly cutting every particle of it off the subjacent tendon, or fascia. The greatest care must be taken, not to make any opening in the cyst, so as to let out its contents, and make it collapse; a circumstance, which would render the dissection of it entirely out much more difficult.

The operation being accomplished, the skin is to be brought together with sticking plaster, and a compress placed over the situation of the tumour, with a view of healing the wound and the cavity by adhesion.

When the ganglion has burst, or is ulcerated, it is best to remove the diseased skin, together with the cyst, and of course the incision must be oval, or circular, as may seem most convenient. The grand object is not to allow any particle of the cyst to remain behind, as it would be very likely to throw out a fungus, and prevent a cure. In Warner's Cases of Surgery is an account of two considerable ganglions, which this gentleman thought it right to extirpate. These had become adherent to the tendons of the fingers. In the operation, he was obliged to cut the transverse ligament of the wrist, and the patients, who before could not shut their hands, nor close their fingers, perfectly regained the use of these parts. Mr. Gooch relates a case of the same kind, which had been occasioned by a violent bruise, three, or four, years before. The tumour reached from the wrist to the middle of the hand, and created a great deal of pain. Mr. Gooch extirpated it, and then restored the position of the hand, and free motion of the joint, by the use of emollient applications, and suitable pressure, made with a machine constructed for the purpose. Other cases, confirming the safety of cutting out ganglions, are recorded in the London Medical Journal for 1787, p. 154; and by Eller, in Mém. de l'Acad. des Sciences de Berlin, Tom. 2, ann. 1746.

The ganglions, which occur just below the knee, I have seen cured by a little blister, applied over them, and kept open with the savin cerate.

For information, relative to ganglions, consult *Warner's Cases in Surgery. Chirurgical Works of B. Gooch, Vol.* 2, *p.* 376. *Heister's Surgery. B. Bell's Surgery. Iatta's System of Surgery. L'Encyclopédie Méthodique; Partie Chirurgicale; art. Gu-*

ronele. *Richter's Anfangsgrunde der Wundarzneykunst, Band.* 1. *Lassus, Pathologie Chirurgicale, Tom.* 1. *p.* 399.

GANGRÆ'NA ORIS. See *Cancrum Oris.*

GANGRENE. (from γαινω, to feed upon.) *Gangræna.* An incipient mortification, so named from its eating away the flesh.

Authors have generally distinguished mortification into two stages; the first, or incipient one, they name *gangrene*, which is attended with a sudden diminution of pain in the place affected; a livid discolouration of the part, which from being yellowish, becomes of a greenish hue; a detachment of the cuticle, under which a turbid fluid is effused; lastly, the swelling, tension, and hardness, of the previous inflammation, subside, and, on touching the part, a crepitus is perceptible, owing to the generation of air in the gangrenous parts.

Such is the state, to which the term *gangrene* is applied.

When the part has become quite cold, black, fibrous, incapable of moving, and destitute of all feeling, circulation, and life; this is the second stage of mortification, termed *sphacelus.* Gangrene, however, is frequently used synonymously with the word mortification. (See *Mortification.*)

GANGRE'NE SCORBUTIQUE DES GENCIVES. See *Cancrum Oris.*

GASTRITIS. (from γαστηρ, the stomach.) An inflammation of the stomach.

GASTROCELE. (from γαστηρ, the stomach, and κηλη, a tumour.) A hernia of the stomach.

GASTRORAPHIA, or GASTRORAPHE. (from γαστηρ, the belly, and ραφη, a suture.) A suture of the belly, or some of its contents.

Although the term *gastroraphe*, in strictness of etymology, signifies no more, than sewing up any wound of the belly, yet Mr. Samuel Sharp informs us, that, in his time, the word implied, that the wound of the abdomen was complicated with another of the bowels.

The moderns, I think, seem to limit the meaning of the word to the operation of sewing up a wound of the parietes of the abdomen.

What was formerly meant by gastroraphe could scarcely ever be practised, because the symptoms laid down for distinguishing when an intestine is wounded, do not with any certainty determine in what particular part it is wounded; which want of information, makes it absurd to open the abdomen in order to get at it. Hence, the operation of stitching the bowels can only take place, when they fall out of the abdomen, and when we can see where the wound is situated.

The circumstances, making the practice of sewing up a wounded intestine proper, are so rare, that Du Verney, who was the most eminent surgeon in the French army a great many years during the wars, and fashion of duelling, declared, he never had once an opportunity of practising the gastroraphe, according to the former acceptation of that word.

Upon the supposition of the intestine being wounded in such a manner as to require the operation, Mr. Sharp advises taking a straight needle with a small thread, laying hold of the bowel with your left hand, and sewing up the wound with the glover's stitch, that is, by passing the needle through the lips of the wound from within outwards all the way, so as to leave a length of thread at both ends, which are to hang out of the incision of the abdomen. He then directs you carefully to make the interrupted suture of the external wound, and to pull the bowel by the small threads into contact with the peritoneum, for the more readily uniting with it afterwards by adhesion; though he seems to think it would be more secure to pass the threads with the straight needle through the lower edges of the wound of the abdomen, which would more certainly hold the intestine in that situation. In about six days, the ligature of the intestine will be loose enough to be drawn away; in the interim, superficial dressings are to be applied, and the patient kept on low diet. (*Sharp.*)

On this operation, we have only to remark, that as the only use of a suture of the bowel is to keep the wound of it near the external wound, in case any extravasation should occur, this object can be as effectually accomplished by one fine stitch, as by sewing up all the breach in the intestine, and without being so likely to excite inflammation of the parts. We shall add no more concerning sutures of the bowels, to what is contained in the articles *Abdomen*, and *Hernia.*

Gastroraphe, or merely sewing up a wound of the parietes of the abdomen, may be done, as Mr. Sharp explains, with the common interrupted suture, (see *Suture*) or with the quilled one, which is better, as follows:

A ligature, capable of splitting into two, has a needle attached to each end of it. The operator is to put the index finger of his left hand into the wound, under the lip furthest from him. This finger is in contact with the peritoneum, in order that it may with the thumb pinch up, and raise the whole thickness of the parietes. With the other hand, one of

the needles is to be introduced into the abdomen, guiding its point on the index finger, in order to avoid wounding the omentum, or intestines. The lip of the wound is to be pierced, from within outward, about an inch from its edge. The other needle is to be passed in the same way through the opposite lip. Then the two needles are to be cut off. As many such sutures must be made, as the extent of the wound may require.

The sides of the wound are next to be brought together, and we are to prepare to tie the ligatures, not in a bow, in the way of the interrupted suture, because the continual action of the abdominal muscles might make the ligatures cut their way through the parts. It is better, to divide each end of the ligatures into two portions, and to tie these over a piece of bougie laid along the line at which the ligatures emerge from the flesh. This is to be done to all the ligatures on one side first. Then the wound being closed, another piece of bougie is to be placed along the other lip of the wound, and the opposite ligatures tied over it, with sufficient tightness, to keep the sides of the wound in contact. This suture is certainly preferable to the interrupted one, because a great deal of its pressure is made on the two pieces of bougie, and of course it is less likely to cut its way out. Its operation is to be assisted with compresses laid over each side of the wound, and the uniting bandage. Every thing, that puts the abdominal muscles into action, drags the suture, irritates the wound, and creates a risk of the threads cutting their way through the part, in which they are introduced; consequently, it must be avoided. To prevent, as much as possible, the exertion of the muscles, the bowels should be kept open with clysters; and opium is the best thing for putting a stop to the vomiting, sometimes attendant on wounds of the abdomen, and producing very injurious effects, in regard to the wound.

In about a week, the sutures may generally be removed, and sticking plaster alone employed. As to what more relates to these particular cases, we must refer to *Abdomen, Wounds of.*

It is generally allowed, that sutures are violent means, to which we should only resort, when it is impossible to keep the lips of a wound in contact by the observance of a proper posture, and the aid of a methodical bandage. M. Pibrac believes such circumstances exceedingly uncommon, and in his excellent production, in the third volume of the Memoirs of the Royal Academy of Surgery, relative to the abuse of sutures, cases are related, which fully prove, that wounds of the belly readily unite by means of a suitable posture and a proper bandage, without having recourse to gastroraphe. These, however, are less decisive and convincing, (if possible to be so) than the relations of the Cæsarean operation, the extensive wound of which has oftentimes been healed by these simple means, after the failure of sutures. It is not only possible to dispense with gastroraphe in the treatment of wounds of the abdomen, it has even been manifested, that this operation has sometimes occasioned very bad symptoms.

Under certain circumstances, however, it may be essentially necessary to practise gastroraphe. For instance, were a large wound to be made across the parietes of the abdomen, a suture might become indispensably requisite, to prevent a protrusion of the bowels. Yet, even in this case, the sutures should be as few in number as possible.

A bandage of the eighteen-tailed kind, might prove very useful in a longitudinal wound of the abdomen, and do away all occasion for gastroraphe. (See *Sutures.*)

We shall conclude this article with a fact, perhaps, more curious, than instructive, related by M. Bordier, of Pondicherry, in the *Journal de Medicine*, vol. 26. 538. An Indian soldier, angry with his wife, killed her, and attempted to destroy himself by giving himself a wound with a broad kind of dagger in the abdomen, which caused a protrusion of the bowels. A doctor of the country, being sent for, dissected between the muscles and skin, and introduced there a thin piece of lead, which kept up the bowels. The wound soon healed up, the lead having produced no inconvenience. The man was afterwards hung, and M. Bordier, when the body was opened, assured himself more particularly of the fact. Indeed, numerous cases prove, that lead may lodge in the living body, without occasioning the inconvenience, which results from the presence of almost any other kind of extraneous body.

See *Le Dran's Opérations de Chirurgie. Sharp's Treatise on the Operations of Surgery. L'Encyclopédie Méthodique; Partie Chirurgicale, art. Gastroraphè; La Medecine Operatoire par Sabatier, Tom.* I.

GASTROTOMIA. (from λαστης, the belly, and τεμνω, to cut.) The operation of opening the abdomen and uterus. The Cæsarean operation. It also signifies opening the abdomen for other purposes.

GLAUCOMA. (from γλαυκος, blue.) A disease of the eye, in which the crystalline lens becomes of a blue, or sea-green colour. The exact meaning of this ancient term, however, is very undetermined; some say it is a disease of the crystalline; others, that it is an affection of the vitreous humour. Galen in his book

de usu partium imputes glaucoma to a morbid dryness of the crystalline; in which sentiment he has been followed by Ætius, and Maitre-Jan, at the commencement of the 18th century. Since, however, the cataract has been decidedly ascertained to depend upon a disease of the crystalline; the term glaucoma, has been reserved for an opacity of the vitreous humour, as we may learn from Heister, Platner, and all the oculists, who published about the middle of the last century. Lancisi mentions, that he once found the vitreous humour cartilaginous; and Morand has seen it converted into a stony substance. These instances, and some others, are in favour of the opinion, that glaucoma, may arise from an opacity of the vitreous humour. A glaucoma, even of a confirmed kind, cannot always be easily distinguished from a cataract, especially, while the latter is in an incipient state. It is said, however, that suspicions of the disease may be entertained, when the unnatural colour, which characterizes it, is reflected from a deep surface, behind the pupil; whereas the opacity of a cataract is more superficial, and nearer to the margin of the uvea.

Glaucoma is certainly an exceedingly uncommon disease. Authors recommend applying blisters, and giving internally the extract of cicuta, calomel, and soap. (*Encyclopédie Méthodique; Partie Chir.*) The topical use of æther may also be tried, which we have mentioned, as one of Mr. Ware's remedies for promoting the absorption of cataracts.

From our present knowledge of the power of the absorbents to remove opaque substances in the eye, when such are detached and loose, as they actually become after being disturbed with a couching needle, there can be no doubt that, if an opacity of a part of the vitreous humour were to present itself in practice, and not yield to the above means, it would be justifiable conduct, on the part of the surgeon, to endeavour to move such opacity out of the axis of sight, and, at all events, to disturb it so freely with a couching needle, as to afford a chance of its being absorbed.

GLAUCOSIS, same as *Glaucoma*.

GLEET. By the term *gleet*, we commonly understand a continued running, or discharge, after the inflammatory symptoms of a clap for some time have ceased, being unattended with pain, scalding in making water, &c. Mr. Hunter remarks, that it differs from a gonorrhœa in being uninfectious, and in the discharge consisting of globular bodies, contained in a slimy mucus, instead of serum. He says, that a gleet seems to take its rise from a habit of action, which the parts have contracted. The disease, however, sometimes stops of itself, even after every method has been ineffectually tried. This probably depends upon accidental changes in the constitution, and not at all upon the nature of the disease itself. Mr. Hunter suspected some gleets were connected with scrophula. The sea-bath cures more gleets, than the common cold bath, or any other mode of bathing. An injection of diluted sea-water cures some gleets, though it is not always effectual.

Gleets are always attended with a relaxed constitution. They also sometimes arise from other affections of the urethra, besides gonorrhœas. A stricture is almost always attended with a gleet; so sometimes is disease of the prostate gland.

When a gleet, observes Mr. Hunter, does not arise from any evident cause, nor can be supposed to be a return of a former gleet, in consequence of a gonorrhœa, either a stricture or diseased prostate gland is to be suspected; an enquiry should be made whether the stream of urine is smaller than common, whether there be any difficulty in voiding it, and whether the calls to make it are frequent. If there should be such symptom, a bougie, rather under the common size, should be introduced; and, if it passes on to the bladder with tolerable ease, the disease is probably in the prostate gland, which should next be examined. (See *Urethra, Strictures of; and Prostate Gland, Diseased.*)

Balsams, turpentines, and cantharides, given internally, are of use, especially in slight cases; and when they are useful, prove so almost immediately. Hence, if they neither lessen nor remove the gleet in five or six days, Mr. Hunter never continued them longer. As the discharge, when removed, is also apt to recur, such medicines should be continued for some time after the symptoms have disappeared.

The cold bath, sea-bath, bark, and steel, may be given when the whole constitution is weak. The astringent gums, and salt of steel, given as internal astringents, have little power.

With regard to local applications, the astringents commonly used are, the decoction of bark, white vitriol, alum, and preparations of lead. The aqua vitriolica, cærulea, of the London Dispensatory, diluted mith eight times its quantity of water, makes a very good injection.

Irritating applications are, either injections, or bougies, simple or medicated with irritating medicines. Violent exercise may be considered as having the same effect. Such applications should never be used till the other methods have been fully tried, and found unsuccessful. They at first increase the discharge. Two grains of the hydrargyrus muriatus, in eight ounces of water, are a very good irritating injection. In irritable habits, such an

application may do great harm, and the capability of the parts to bear its employment, should first be made out, if possible.

Bougies sometimes act violently, and are more efficacious than injections. A simple unmedicated one is generally sufficient, and must be used a month or six weeks, before the cure can be depended upon. Those medicated with camphor, or turpentine, need not be used so long. The size of the bougie should be under the common.

Mr. Hunter has known a gleet disappear on the breaking out of two chancres on the glans. Gleets have also been cured by a blister on the under-side of the urethra; and, by electricity.

In every plan of cure, rest, or quietness, is generally of great consequence; but, after the failure of the usual modes, riding on horseback has immediately effected a cure.

Regularity and moderation in diet are to be observed.

Intercourse with women often causes a return, or increase of gleet; and, in such cases, it gives suspicion of a fresh infection; but the difference between this and a fresh infection is, that here the return is almost immediately after the connexion.

Gleets in women, are cured like those of men. Turpentines, however, have no specific effect on the vagina. The astringent injections may also be stronger, than those for men.

See *A Treatise on the Venereal Disease, by John Hunter. Also, Swediaur's Practical Observations on Venereal Complaints.*

GLOSSOCA'TOCHUS. (from γλωσσα, the tongue; and κατιχω, to depress.) An instrument for pressing down the tongue; a spatula. The ancient glossocatochus was a sort of forceps, one of the blades of which served to depress the tongue, while the other was applied under the chin.

GLOSSOCOMION. (from γλωσσα, the tongue; and κομεω, to guard.) By this was formerly meant a case for the tongue of a hautboy; but the old surgeons, by metaphor, used the term to signify a case for a broken limb.

GOITRE. See *Bronchocele.*

GONORRHŒA. (from γονη, the semen; and ρεω, to flow.) Etymologically, an involuntary discharge of the semen; but always, according to modern surgery, a discharge of a purulent infectious matter, from the urethra in the male, and from the vagina and surfaces of the labiæ, nymphæ, clitoris, &c. in the female subject.

This disease occurs, in Latin authors, under the different denominations of *gonorrhœa, G. Virulenta, Fluor albus malignus.* Dr. Swediaur, after censuring the etymological import, as conveying an erroneous idea, says, if a Greek name is to be retained, he would call it blennorrhagia, from βλεννα, mucus, and ρεω, to flow. However, as most moderns consider the discharge as pus, not mucus, the etymological import of blennorrhœa is as objectionable as that of gonorrhœa. In English, the disease is commonly called a *clap*, from the old French word *clapises*, which were public shops, kept and inhabited by single prostitutes, and generally confined to a particular quarter of the town, as is even now the case in several of the great towns in Italy. In German, the disorder is named a *tripper*, from dripping; and in French, a *chaudepisse*, from the heat and scalding in making water. (*Swediaur.*)

We shall first present the reader with some of Mr. Hunter's opinions, concerning the nature of gonorrhœa, its symptoms, and treatment; and, lastly, take notice of what some other writers have said.

When an irritating matter of any kind is applied to a secreting surface, it increases that secretion, and changes it from its natural state to some other. In the present instance, it is changed from mucus to pus.

Till about the year 1753, it was generally supposed, that the matter from the urethra, in a gonorrhœa, arose from ulcers in the passage; but it was then clearly ascertained, that pus could be secreted without a breach of substance. It was first accidentally proved, by dissection, that pus could be formed in the bag of the pleura, without ulceration; and Mr Hunter afterwards examined the urethra of malefactors and others, who were executed, or died, while known to be affected with gonorrhœa, and demonstrated that the canal was entirely free from every appearance of ulcer.

The time, when a gonorrhœa first appears, after infection, is very various. It generally comes on sooner, than a chancre. Mr. Hunter has had reason to believe, that, in some instances, the disease has begun in a few hours, while, in others, six weeks have previously elapsed; but he has known it begin at all the intermediate periods. About six, eight, ten, or twelve days, however, after infection, is the most common period.

The surface of the urethra is subject to inflammation and suppuration, from various other causes besides the venereal poison; and sometimes discharges happen spontaneously, when no immediate cause can be assigned. Such may be called *simple* gonorrhœa, having nothing of the venereal infection in them.

Mr. Hunter has known the urethra sympathize with the cutting of a tooth, and produce all the symptoms of a gonorrhœa. This happened several times to the

same patient. The urethra is known to be sometimes the seat of the gout; Mr. Hunter has known it to be the seat of rheumatism.

When a secreting surface has once received the inflammatory action, its secretions are increased and visibly altered. Also, when the irritation has produced inflammation, and an ulcer in the solid parts, a secretion of matter takes place, the intention of which, in both, seems to be to wash away the irritating matter. But, in inflammations, arising from specific, or morbid poisons, the irritation cannot be thus got rid of; for, although the first irritating matter be washed away, yet, the new matter formed has the same quality as the original had; and therefore, upon the same principle, it would produce a perpetual source of irritations, even if the venereal inflammation, like many other specific diseases, were not what it really is, kept up by the specific quality of the inflammation itself. This inflammation seems, however, to be only capable of lasting a limited time, the symptoms peculiar to it vanishing of themselves, by the parts becoming less and less susceptible of irritation. The consequent venereal matter can have no power of continuing the original irritation, otherwise there would be no end to the disease. The time, which the susceptibility of the irritation lasts, must depend upon the difference in the constitution, and not upon any difference in the poison itself.

The venereal disease only ceases spontaneously, when it attacks a secreting surface, and produces a mere secretion of pus, without ulceration.

SYMPTOMS OF GONORRHŒA.

The first symptom is generally an itching at the orifice of the urethra, sometimes extending over the whole glans. A little fulness of the lips of the urethra, the effect of inflammation, is next observable, and soon afterwards a running appears.

The itching changes into pain, more particularly at the time of voiding the urine. There is often no pain till some time after the appearance of the discharge, and other symptoms; and in many gonorrhœas, there is hardly any pain at all, even when the discharge is very considerable. At other times, a great degree of soreness occurs long before any discharge appears. There is generally, at this time, a particular fulness in the penis, and more especially in the glans. The glans has also a kind of transparency, especially near the beginning of the urethra, where the skin, being distended, smooth, and red, resembles a ripe cherry. The mouth of the urethra is, in many instances, evidently excoriated. The surface of the glans itself is often in a half-excoriated state, consequently very tender; and it secretes a sort of discharge. The canal of the urethra becomes narrower, which is known by the stream of urine being smaller than common. This proceeds from the fulness of the penis in general, and from the lining of the urethra being swollen, and in a spasmodic state. The fear of the patient, while voiding his urine, also disposes the urethra to contract. The stream of urine is generally much scattered and broken, as soon as it leaves the passage. There is frequently some degree of hemorrhage from the urethra, perhaps, from the distention of the vessels, more especially when there is a chordee, or a tendency to one. Small swellings often occur, along the lower surface of the penis, in the course of the urethra. These, Mr. Hunter suspected to be enlarged glands of the passage. They occasionally suppurate, and burst outwardly, but now and then in the urethra itself. Mr. Hunter has also suspected such tumours to be ducts, or lacunæ of the glands of the urethra distended with mucus, in consequence of the mouth of the duct being closed, in a manner similar to what happens to the duct leading from the lachrymal sac to the nose, and so as to induce inflammation, suppuration, and ulceration. Hardness and swelling have also occurred in the situation of Cowper's glands, and ended in considerable abscesses in the perineum. The latter tumours break either internally or externally, and sometimes in both ways, so as to produce fistulæ in perinæo.

A soreness is often felt all along the under side of the penis, frequently extending as far as the anus. The pain is particularly great in erections; but the case differs from chordee, the penis remaining straight.—Erections are frequent in most gonorrhœas, and even sometimes threaten to bring on mortification. As opium is of great service, Mr. Hunter thinks there is reason to suppose them of a spasmodic nature.

The natural slimy discharge from the glands of the urethra is first changed, from a fine transparent ropy secretion, to a watery whitish fluid; and the lubricating fluid, which the passage naturally exhales, becomes less transparent; both these secretions becoming gradually thicker, assume more and more the qualities of common pus.

The matter of gonorrhœa often changes its colour and consistence, sometimes from a white to a yellow, and often to a greenish colour. These changes depend on the increase and decrease of the inflammation, and not on the poisonous quality of the matter itself; for, any irritation on these

parts, equal to that produced in a gonorrhœa, will produce the same appearances.

The discharge is produced from the membrane lining the urethra, and from the lacunæ, but, in general, only for about two or three inches * from the external orifice. Whenever Mr. Hunter had an opportunity of examining the urethra affected with gonorrhœa, he always found the lacunæ loaded with matter, and more visible than in the natural state. Before the time of this celebrated man, it was commonly supposed, that the discharge arose from the whole surface of the urethra, and even from Cowper's glands, the prostate and vesiculæ seminales.

But, if the matter were secreted from all these parts, the pus would collect in the bulb, as the semen does, and thence be emitted in jerks; for, nothing can be in the bulbous part of the urethra, without stimulating it to action, especially, when in a state of irritation and inflammation.

When the inflammation is violent, some of the vessels of the urethra often burst, and a discharge of blood ensues. Sometimes such blood is only just enough to give the matter a tinge. The erections often stretch the part so much as to cause an extravasation.

When the inflammation goes more deeply than the membranous lining, and affects the reticular membrane of the urethra, it produces in it an extravasation of coagulable lymph, the consequence of which is a chordee. (See *Chordee*.)

Mr. Hunter suspected, that the disease is communicated or creeps along from the glans to the urethra, or, at least, from the lips of the urethra to its inner surface, as it is impossible, that the infectious matter can, during coition, get as far as the disease extends. He mentions an instance, in which a gentleman, who had not cohabited with any woman for many weeks, to all appearances caught a gonorrhœa from a piece of plaster, which had adhered to his glans penis, in a necessary abroad, and which is accounted for by supposing that some person, with a clap, had previously been to this place, and had left behind some of the discharge, and that the above gentleman had allowed his penis to remain in contact with the matter, till it had dried.

Many symptoms, depending on the sympathy of other parts with the urethra, sometimes accompany a gonorrhœa. An uneasiness, partaking of soreness and pain, and a kind of weariness, are every where felt about the pelvis. The scrotum, testicles, perinæum, anus, and hips, become disagreeably sensible to the patient, and the testicles often require being suspended. So irritable, indeed, are they in such cases, that the least accident, or even exercise, which would have no such effect at another time, will make them swell. The glands of the groin are often affected sympathetically, and even swell a little, but do not suppurate, as they generally do when they inflame from the absorption of matter. Mr. Hunter has seen the irritation of a gonorrhœa so extensive as to affect with real pain the thighs, buttocks, and abdominal muscles. He knew one gentleman, who never had a gonorrhœa without being immediately seized with universal rheumatic pains.

When the gonorrhœa, exclusive of the affections arising from sympathy, is not more violent than has been described, it may be called a *common*, or *simple venereal one;* but, if the patient is very susceptible of such irritation, or of any other mode of action which may accompany the venereal, then the symptoms are in proportion more violent. In such circumstances, we sometimes find the irritation and inflammation exceed the specific distance, and extend through the whole urethra. There is often a considerable degree of pain in the perinæum; and a frequent, though not a constant symptom, is a spasmodic contraction of the acceleratores urinæ, and erectores muscles. The inflammation, in these cases, is sometimes considerable, and goes deeply into the cellular membrane, without producing any effect, however, except swelling. In other instances, it goes on to suppuration, often becoming one of the causes of fistulæ in perinæo. Cowper's glands may hence suppurate, and the irritation is often extended even to the bladder itself.

When the bladder is affected, it becomes more susceptible of every kind of irritation. It will not bear the usual distention, and, therefore, the patient cannot retain his water the ordinary time, and the moment the desire of making water takes place, he is obliged instantly to make it, with violent pain in the bladder, and still more in the glans penis, exactly similar to what happens in a fit of the stone. If the bladder be not allowed to discharge its contents immediately, the pain becomes almost intolerable; and even when the water is evacuated, there remains, for some time, a considerable pain, both in the bladder and glans.

The ureters, and even the kidneys, sometimes, though rarely, sympathize, when the bladder is much affected. Mr. Hunter had reason to suspect, that the irritation may be communicated to the peritonæum, by means of the vas deferens.

* P. 50. Mr. Hunter says, seldom further than an inch and a half, or two inches at most. This he terms the specific extent of the inflammation.

Mr. Hunter mentions a case in which, when the inflammatory symptoms of a gonorrhœa were abating, an incontinence of urine came on; but, in time, got spontaneously well.

A very common symptom, attending a gonorrhœa, is a swelling of the testicle. See *Hernia Humoralis*.

Another occasional consequence of a gonorrhœa, is a sympathetic swelling of the inguinal glands. (See *Bubo*.)

A hard chord is sometimes observed, leading from the prepuce along the back of the penis, and often directing its course to one of the groins, and affecting the glands. There is most commonly a swelling in the prepuce, at the part where the chord takes its rise. This sometimes happens when an excoriation and a discharge from the prepuce, or glans penis exist.

From the above account, the symptoms of gonorrhœa, in different cases, seem to be subject to infinite variety. The discharge often appears without any pain; and the coming on of the pain is not at any stated time after the appearance of the discharge. There is often no pain at all, although the discharge is in considerable quantity, and of a bad appearance. The pain often goes off, while the discharge continues, and will return again. An itching, in some cases, is felt for a considerable time, which is sometimes succeeded by pain; though, in many cases, it continues to the end of the disease. On the other hand, the pain is often troublesome, and considerable, even when there is little or no discharge. In general, the inflammation in the urethra does not extend beyond an inch or two from the orifice; sometimes it runs all along the urethra to the bladder, and even to the kidneys, and, in some cases, spreads into the substance of the urethra, producing a chordee. The glands of the urethra inflame, and often suppurate; and Mr. Hunter suspected that Cowper's glands sometimes do the same. The neighbouring parts sympathize, as the glands of the groin, the testicle, the loins, and pubes, with the upper parts of the thighs, and abdominal muscles. Sometimes the disease appears a few hours after the application of the poison; sometimes six weeks elapse first. It is often not possible to determine whether it is a venereal or only an accidental discharge, arising from some unknown cause.

GONORRHŒA IN WOMEN.

The disease is not so easily ascertained in them as in men, because they are subject to a disorder called *fluor albus*, which resembles gonorrhœa. A discharge simply from women, is less a proof of the existence of a gonorrhœa, than even a discharge without pain in men. The kind of matter does not enable us to distinguish a gonorrhœa from a fluor albus; for the discharge in the latter affection often puts on all the appearance of venereal matter Pain is not necessarily present, and therefore forms no line of distinction. The appearance of the parts often gives us but little information; for, continues Hunter, I have frequently examined the parts of those who confessed all the symptoms, such as increase of discharge, pain in making water, soreness in walking, or when the parts were touched, yet I could see no difference between these and sound parts. I know of no other way of judging, in cases where there are no symptoms sensible to the person herself, or where the patient has a mind to deny any uncommon symptoms, but from the circumstances preceding the discharge; such as her having been connected with men supposed to be unsound, or her being able to give the disorder to others; which last circumstance being derived from the testimony of another person, is not always to be trusted to, for obvious reasons.

From the manner, in which the disease is contracted, it must principally attack the vagina, a part not endowed with much sensation. In many cases, however, it produces a considerable soreness on the inside of the labia, nymphæ, clitoris, caruncule myrtiformes, and meatus urinarius. Those parts are so sore, in some cases, as not to bear being touched; the person can hardly walk; the urine gives pain in its passage through the urethra, and when it comes into contact with the above-mentioned parts.

The bladder sometimes sympathizes, and even the kidneys. The mucous glands, on the inside of the labia, often swell, and sometimes suppurate, forming small abscesses, which open near the orifice of the vagina.

Mr. Hunter states, that the venereal matter from the vagina sometimes runs down the perinæum to the anus, and produces a gonorrhœa, or chancre, in that situation. The disease in women may probably wear itself out, as in men; but it may exist in the vagina for years, if the testimony of patients can be relied on.

TREATMENT OF GONORRHŒA.

As every form of the venereal disease arises from the same cause, and as we have a specific for some forms, we might expect that this would be a certain cure for every one; and, therefore, that it must be no difficult task to cure the disease, when in the form of inflammation and suppuration in the urethra. Experience,

however, teaches us, that the gonorrhœa is the most variable in its symptoms, while under a cure; and the most uncertain, with respect to its cure, of any forms of the venereal disease; many cases terminating in a week, while others continue for months, under the same treatment.

The only curative object is, to destroy the disposition and specific mode of action in the solids of the parts, and as they become changed, the poisonous quality of the matter produced will also be destroyed. This effects the cure of the disease, but not always of the consequences.

This form of the disease is not capable of being continued beyond a certain time in any constitution; and when it is violent, or of long duration, it is owing to the part being very susceptible of such irritation, and readily retaining it. As we have no specific remedy for the gonorrhœa, it is fortunate that time alone will effect a cure. It is worthy of consideration, however, whether medicine can be of any service. Mr. Hunter is inclined not to think it of the least use, perhaps, once in ten cases. But even this would be of some consequence, if the cases capable of being benefited could be distinguished.

The means of cure, generally adopted, are of two kinds, internal remedies, and local applications; but, whatever plan is pursued, we are always to attend more to the nature of the constitution, or to any attending disease in the parts themselves, or parts connected with them, than to the gonorrhœa itself.

When the symptoms are violent, but of the common inflammatory kind, known from the extent of the inflammation not exceeding the specific distance, the local treatment may be either irritating or soothing.

Irritating applications, in these cases, are less dangerous, than when there exists irritable inflammation, and they may alter the specific action; but, to produce this effect, their irritation must be greater, than that of the original injury. The parts will afterwards recover of themselves, as from any other common inflammation.

Mr. Hunter believes, however, that the soothing plan is the best at the beginning. If the inflammation be great, and of the irritable kind, no violence is to be used, for it would only increase the symptoms; nothing should be done that may tend to stop the discharge, as doing so would not put a stop to the inflammation. The constitution is to be altered, if possible, by remedies adapted to each disposition, with a view of altering the actions of the parts arising from such disposition, and reducing the disease to its simple form. If the constitution cannot be altered, nothing is to be done, and the action is to be allowed to wear itself out.

When the inflammation has abated, the cure may be attempted by internal remedies, or local applications, not operating violently, which might re-produce the irritation. Gentle astringents may be applied.

But, if the disease has begun mildly, an irritating injection may be used, in order quickly to get rid of the specific mode of action. This application will increase the symptoms for a time; but, when it is left off, they will often abate, or wholly disappear. In such a state of parts, astringents may be used, the discharge being now the only thing to be removed.

When itching, pain, and other uncommon sensations are felt for some time before the discharge appears, Mr. Hunter diffidently expresses his inclination to recommend the soothing plan, instead of the irritating one, in order to bring on the discharge, which is a step towards the resolution of the irritation; and he adds, that to use astringents would be bad practice, as, by retarding the discharge, they would protract the cure. When there are strictures, or swelled testicles, astringents should not be used; for, while there is a discharge, such complaints are relieved.

Mr. Hunter thus expresses himself in regard to the effect of mercury in gonorrhœa: "I doubt very much of mercury having any specific virtue in this species of the disease; for I find that it is as soon cured without mercury as with it, &c. So little effect, indeed, has this medicine upon a gonorrhœa, that I have known a gonorrhœa take place while (the patient was) under a course of mercury, sufficient for the cure of a chancre. Men have also been known to contract a gonorrhœa when loaded with mercury for the cure of a lues venerea; the gonorrhœa, nevertheless, has been as difficult of cure as in ordinary cases."

Mr. Hunter does not say much in favour of evacuants, diuretics, and astringents, given internally. He allows, however, that astringents which act specifically on the parts, as the balsams, conjoined with any other medicine, which may be thought right, may help to lessen the discharge, in proportion as the inflammation abates.

Local applications may be either internal to the urethra, external to the penis, or both. Those which are applied to the urethra seem to promise most efficacy, because they come into immediate contact with the diseased parts. They may be either in a solid or fluid form. A fluid is only a very temporary applica-

tion. The solid ones, or bougies, may remain a long while, but in general irritate immediately, from their solidity alone; and, Mr. Hunter says, the less bougies are used, when the parts are in an inflamed state, the better, though he never saw any bad effects from them, when applied with caution.

The fluid applications, or injections, in use, are innumerable; and as gonorrhœas frequently get well with so many of various kinds, we may infer, that such complaints would, in time, get well of themselves. Injections, however, certainly often have an immediate effect on the symptoms, and hence must have power; though the one which possesses the greatest specific power is unknown. As injections are only temporary applications, they must be used often, especially when found useful, and they are not of an irritating kind.

Mr. Hunter divides injections into four kinds, the *irritating*, *sedative*, *emollient*, and *astringent*.

Irritating injections, of whatever kind, act in this disease upon the same principle; that is, by producing an irritation of another kind, which ought to be greater than the venereal; by which means the venereal is destroyed and lost, and the disease cured, although the pain and discharge may still be kept up by the injection. Those effects, however, will soon go off, when the injection is laid aside. In this way bougies also perform a cure. Most of the irritating injections have an astringent effect, and prove simply astringent when mild.

Irritating injections should never be used when there is already much inflammation; especially, in constitutions, which are known to be incapable of bearing much irritation; nor should they be used when the inflammation has spread beyond the specific distance; nor when the testicles are tender; nor when, upon the discharge ceasing quickly, these parts have become sore; nor when the perinæum is very susceptible of inflammation, and especially if it formerly should have suppurated; nor when there is a tendency in the bladder to irritation, known by the frequency of making water.

In mild cases, and in constitutions which are not irritable, such injections often succeed, and remove the disease almost immediately. The practice, however, ought to be attempted with caution, and not, perhaps, till milder methods have failed. Two grains of the hydrargyrus muriatus, dissolved in eight ounces of distilled water, form a very good irritating injection; but, an injection of only half this strength may be used, when it is not intended to attempt a cure so quickly. If however, the injection, even in that proportion, gives considerable pain in its application, or occasions a great increase of pain in making water, it should be diluted.

Sedative injections will always be of service, when the inflammation is considerable, and they are very useful in relieving the pain. Perhaps, the best sedative is opium, as well when given by the mouth, or anus, as when applied to the part affected, in the form of an injection. But, even opium will not act as a sedative in all constitutions, and parts; but, on the contrary, often has opposite effects, producing great irritability. Lead may be reckoned a sedative, so far as it abates inflammation, while, at the same time, it may act as a gentle astringent. Fourteen grains of saccharum saturni, in ℥viij of distilled water, make a good sedative astringent injection.

Drinking freely of diluting liquors may, perhaps, have a sedative effect, as it in part removes some of the causes of irritation, by rendering the urine less stimulating to the bladder, when the irritation is there, and to the urethra in its passage through it. Diluting drinks may possibly lessen the susceptibility of irritation. The vegetable mucilages of certain seeds and plants, and the emollient gums are recommended. Mr. Hunter does not entertain much opinion of their efficacy, though some of his patients told him they experienced less uneasiness in making water, when their drink was impregnated with mucilaginous substances.

Emollient injections are the most proper, when the inflammation is very great; and they probably act by first simply washing away the matter, and then leaving a soft application to the part, so as to be singularly servicable, by lessening the irritating effects of the urine. Indeed, practice proves this; for a solution of gum-arabic, milk and water, or sweet oil, will often lessen the pain, and other symptoms, when the more active injections have done nothing, or seemed to do harm.

The irritation at the orifice of the urethra, is frequently so great, that the point of the syringe cannot be suffered to enter. In this case, no injection should be used till the inflammation has abated; but, in the mean while, fomentations may be employed.

Astringent injections act by lessening the discharge. They should only be used towards the latter end of the disease, when it has become mild. But, if the disease should begin mildly, they may be used at the very beginning; for, by gradually lessening the discharge, without increasing the inflammation, we complete the cure, and prevent a continuance of the discharge called *gleet*. They will

have an irritating quality, if used strong, and hence increase the discharge, instead of lessening it. Mr. Hunter's experience did not teach him, that one astringent was much better than another. The astringent gums, as dragon's blood, the balsams, and the turpentines, dissolved in water; the juices of many vegetables, as oak, bark, Peruvian bark, tormentil root, and, perhaps, all the metallic salts, as green, blue, and white vitriols; the salts of mercury, and also alum; probably all act much in the same way; though the mere changing of an injection is often efficacious. The external applications are poultices, and fomentations, which can only be useful when the prepuce, glans, and orifice of the urethra are inflamed.

Since Mr. Hunter's time, many surgeons have been in the habit of keeping the penis, in the incipient inflammatory stage of gonorrhœa, covered with linen, kept continually wet with the saturnine lotion; a practice which is certainly both rational and beneficial. Mr. Abernethy, in his Lectures on Surgery, speaks in favour of this method.

When the glands of the urethra are enlarged, mercurial ointment may be rubbed on the part; and this will probably be of more service after the inflammation has subsided.

TREATMENT OF GONORRHŒA IN WOMEN.

This is nearly the same as that of the disease in men, but is more simple. When the disorder is in the vagina, injections are best; and after them, the parts may be smeared with mercurial ointment, and the external parts washed with the injection. It is almost impossible for the patient to throw an injection into the urethra, when it is affected. The same injections are proper as for men; but they may be made doubly strong. When the glands of the vagina are enlarged, mercurial ointment should be freely applied; and when they form abscesses, these should be opened, and dressed.

CONSTITUTIONAL TREATMENT OF GONORRHŒA.

In many strong plethoric constitutions, the symptoms are violent, and there is a great tendency to inflammatory fever. In such instances, opiate clysters, though at first productive of relief, sometimes occasion in the end fever, and consequently aggravate all the symptoms. The balsam capivi, sometimes, in such cases, increases the inflammatory symptoms. The treatment of this kind of constitution, consists chiefly in evacuations, the best of which are bleeding and gentle purging. To live sparingly, and, above all, to use little exercise, is necessary.

In the weak and irritable constitution, the symptoms are frequently very violent, the inflammation extending beyond the specific distance, running along the urethra, and even affecting the bladder. The indication, in this instance, is to strengthen; and bark alone has been known to effect a cure. All evacuations are hurtful.

The fever has been known to stop the discharge, relieve the pain in making water, and finally cure the disease. On other occasions, Mr. Hunter has seen all the symptoms of gonorrhœa cease on the accession of a fever, and return when the fever was subdued. In other examples, a gonorrhœa mild at first, has been rendered severe by the coming on of a fever, and, on this ceasing, the gonorrhœa has ceased. Although a fever does not always cure a gonorrhœa, yet, as it may do so, nothing should be done while it lasts. If the local complaint should continue after the fever is gone, it is to be treated according to symptoms.

A gonorrhœa may be considerably affected by the patient's manner of living, and by other diseases attacking the constitution. Most things which hurry or increase the circulation, aggravate the symptoms; such as violent exercise, drinking strong liquors, eating strong indigestible food, some kinds of which act specifically on these parts, so as to increase the symptoms more than simply heating the body would do; such as peppers, spices, and spirits.

In cases which have begun mildly, in which the inflammation is only slight, or in others, in which the violent symptoms have subsided, such medicines as have a tendency to lessen the discharge, may be given, together with the local remedies before mentioned. Turpentines are the most efficacious. Cantharides, the salts of lead and copper, and alum, have also been recommended.

Mr. Hunter advises small doses of mercury, in consequence of the possibility of absorption, and with a view of preventing lues venerea.

TREATMENT OF OCCASIONAL SYMPTOMS OF GONORRHŒA.

Bleeding from the urethra is sometimes relieved by the balsam capivi. Mr. Hunter did not find astringent injections of use.

Painful erections are greatly prevented by taking twenty drops of tinctura opii at bed-time. Cicuta has also some power in this way.

Chordee. See this word.

Bladder affected. Opiate clysters, the

warm bath, and bleeding, if the patient is of full habit, are proper. Leeches may be applied to the perinæum. When this affection lasts a considerable time, and is not mitigated by common methods, Mr. Hunter advises trying an opiate plaster on the pubes, or the loins, where the nerves of the bladder originate; or a small blister on the perinæum. In another place, he mentions bark, cicuta, sea air, and sea bathing, among the proper means.

Swelled testicles. See *Hernia Humoralis.*

For a more full account of Gonorrhœa, according to the above doctrines, see a *Treatise on the Venereal Disease, by John Hunter*, from page 29 to 90.

ON THE QUESTION, WHETHER GONORRHŒA IS REALLY A FORM OF THE VENEREAL DISEASE?

The foregoing remarks, and other ones in Mr. Hunter's work, would lead one to believe, that the poison of gonorrhœa and the venereal virus are the same. Here it is our duty impartially to state the arguments, which have been urged for, and against, this important doctrine.

Mr. Hunter assures us, that he has seen all the symptoms of lues venereal originating from gonorrhœa only; that he had even produced venereal chancres by inoculating with the matter of gonorrhœa; and that he afterwards repeated these experiments in a manner in which he could not be deceived. P. 293, & *seq.*

Mr. Hunter's experiments, it is true, have been repeated with a different result; but, as an eminent modern writer remarks, can we wonder at this, when we consider from how many causes gonorrhœa may arise, and how impossible it is to distinguish the venereal from any other? (*Observations on Morbid Poisons, by J. Adams, M. D. p.* 91. *edit.* 2.)

Another argument adduced by Hunter, in favour of the poisons of gonorrhœa and chancre being the same, is the probability, that the Otaheitans had the venereal disease propagated to them by European sailors, who were affected with gonorrhœa; for these can hardly be supposed to have had a chancre, during a voyage of five months, without the penis being destroyed.

It is impossible, however, to say what time may elapse, between the application of venereal poison to the penis, and the commencement of ulceration. Therefore, Bougainville's sailors, alluded to by Mr. Hunter, might have contracted the infection at Rio-de-la-Plata; but actual ulcers on the penis might not have formed till about five months afterwards, when the ship arrived at Otaheite.

In attempting to explain why a gonorrhœa and a chancre do not equally produce lues venerea, and why the medicine which almost universally cures chancre, has less effect on gonorrhœa, a modern advocate for Mr. Hunter's doctrine says, that we must take into consideration, that the seat of the two diseases is different; that the same cause may produce different effects upon different parts; that the same poison, when mixed with different fluids, may be more or less violent in its operation; and that there may be greater or less attraction of certain fluids to a part, according to its nature and composition. (*Inquiry into some Effects of the Venereal Poison by S. Sawrey*, 1802. p. 4.) Mr. Sawrey very truly remarks, p. 6, that if gonorrhœal matter has clearly and decidedly produced chancre, or contaminated the system *in any one instance*, the question is determined. It could in no instance produce these effects, unless it had the power of doing so. This writer brings forward some cases to shew, that the poison of gonorrhœa may produce gonorrhœa, or chancre; but, the limits of this work only afford room to observe, that these instances are by no means decisive of the point, as some objections may be urged against them, as indeed, Mr. Sawrey himself allows. That Mr. Hunter's cases are inconclusive, I have endeavoured to explain in the *First Lines of the Practice of Surgery*, to which I must refer my readers.

Why does not gonorrhœa commonly produce ulceration in the urethra? Mr. Sawrey tries to solve this question, by saying, that the product of the venereal inflammation, the diseased contents of the small arteries of the urethra, are thrown out of these open-mouthed vessels into this canal, without any breach in their texture, which otherwise would be a necessary consequence.

Why does not gonorrhœa equally contaminate the system as chancre? In gonorrhœa, says Mr. Sawrey, the discharge is very plentiful; it is not, in general, attended with ulceration; the poison is much more diluted, and mixed with a mucous and puriform fluid. It is deposited in the urethra, and its lacunæ, where little or no pressure is applied, and it finds easy egress out of the canal. In chancre there is breach of substance, the poison is not much diluted, &c.

Why does not chancre generally, in the same person, produce gonorrhœa, and gonorrhœa chancre? Mr. Sawrey, in answer, expresses his belief, that these incidents are not very unfrequent. He says, he has known persons having a chancre, which continued for months, become affected, after that time, with a clap, without any further exposure. His opinion is, that the matter of the chancre

had insinuated itself into the urethra, and produced the disease; though, he confesses, many would explain the circumstance, by supposing that the chancre and gonorrhœa were both communicated at the same time by two different poisons.

Mr. Hunter remarks, that the presence of one disease renders the adjacent parts less susceptible of its influence.

Mr. Sawrey concludes his second chap. with inclining to the idea, that the matter of gonorrhœa is not strictly pus, but of a more mucous nature than that of a chancre. However, when he mentions chemical attractions, as drawing the poison from mucus to the urethra, and from pus to the dry parts, in order to explain the last of the above questions, every sober reader must feel sorry, that a work, which contains some really sensible observations, should comprehend this most unfortunate one.

Mr. Whately has also written, in support of the opinion, that the matter of gonorrhœa and that of chancre, are the same. (See *Whately on Gonorrhœa Virulenta.*)

Another defender of this side of the question is Dr. Swediaur, who endeavours to prove the fallacy of the following positions: 1. *That the poison which produces the clap, does never, like that of chancres, produce any venereal symptoms in the mass or lues itself.* 2. *That the poison of the clap never produces chancres, and that the poison of chancres never produces a clap.* 3. *That mercury never contributes to, nor accelerates the cure of a clap; but that, on the contrary, every blennorrhagia may be certainly cured without mercury, and without any danger of leaving a lues behind.*

His arguments run thus:—the reason why claps do not, like chancres, constantly produce the lues, is, that most of them excite only a superficial inflammation in the membrane of the urethra, without any ulceration. Hence absorption cannot easily take place, the poison being out of the course of the circulation. But he has seen claps, with an ulcer in the urethra, followed by the most unequivocal symptoms of lues itself. He mentions the urethra being defended with a large quantity of mucus, as the thing impeding the common formation of ulcers, which do occasionally occur when the mucus is not secreted as usual, or is washed away. He asserts, that in many cases, where he had occasion to examine both parties, he was convinced that chancres were communicated by a person affected with a simple gonorrhœa; and, *vice versa*, that a virulent clap had been the consequence of an infection from a person having merely chancres. He says, that if a patient, with a venereal running, does not take care to keep the prepuce and glans perfectly clean, chancres will very often be produced. He owns a great many claps are cured without mercury: yet, repeated experience has shewn him, a cure cannot always be thus accomplished. Mild cases, without ulcer or excoriation in the urethra, may certainly be radically cured without a grain of mercury; and though mercury should be given, it would not have the least effect: not because the disease does not proceed from a venereal poison, but because out of the course of the circulation. He contends, that the topical use of mercury in injections, acts usefully even in these cases. But, when a clap is joined with ulceration in the urethra, it is always cured more safely and expeditiously with mercury, and is frequently incurable without it. A lues also follows cases attended with ulcers in the urethra. He allows that all claps are not venereal. (See *Practical Observations on Venereal Complaints, by J. Swediaur.*)

One argument urged against the identity of gonorrhœal and chancrous virus, is, that gonorrhœa was not described as a symptom, till nearly half a century after the other symptoms of the venereal disease were known. Fallopius is among the first who observed gonorrhœa, as a symptom of the venereal disease. "If, however," says Dr. Adams, "venereal gonorrhœa was unnoticed till about fifty years after the other forms of the disease were described, what does this prove, but that contagious gonorrhœa was so common, as to be disregarded as a symptom of the new complaint? Can there be a doubt, from the caution given by Moses, that gonorrhœa was considered as contagious in his days? During the classical age, we find inconveniences of the urinary passages, were imputed to incontinence; and the police of several states, before the siege of Naples, made laws for preserving the health of such as would content themselves with public stews, instead of disturbing the peace of families. This is enough to lessen our surprise, that gonorrhœa should be unnoticed for some time after the appearance of the venereal disease. But, so far is it from proving the two contagions are different, that the fairest inference we can draw is in favour of their identity. For, if by this time the venereal disease began to be so far understood, that secondary symptoms were found the consequence of primary ones in the genitals, it is most probable that the first suspicion of venereal gonorrhœa arose from the occurrence of such secondary appearances, where no other primary symptoms could be traced." (*Adams on Morbid Poisons, p. 95, Edit. 2.*)

In relating the arguments maintained by the best modern writers, to repel the

attacks made on the doctrine, that gonorrhœa and chancre arise from the same poison, we have been compelled to disclose the chief grounds, on which the assailants venture to entertain a contrary theory.

Mr. B. Bell is the principal author who has written against the opinions maintained by Hunter, Sawrey, Swediaur, Adams, &c. Our limits will only allow us just to enumerate a few of his leading arguments.

If the matter of gonorrhœa, and that of chancre, were of the same nature, we must admit that a person with a chancre only, can communicate to another, not only every symptom of pox, but of gonorrhœa; and that another, with gonorrhœa only, can give to all, with whom he may have connexion, chancres, with their various consequences. This ought, indeed, to be a very frequent occurrence; whereas, all allow that it is even in appearance very rare.

On the supposition of the matter of gonorrhœa and lues venerea being the same, the latter ought to be a much more frequent occurrence than the former, from the greater ease with which the matter of infection must, in every instance, be applied to those parts on which it can produce chancres, than to the urethra, where, instead of chancre or ulceration, it almost always excites gonorrhœa. It is difficult to conceive how the matter, by which the disease is communicated, should find access into the urethra; while all the external parts of the penis, particularly the glans, must be easily and universally exposed to it; and yet gonorrhœa is a much more frequent disease than pox. Cases of gonorrhœa are in proportion to those of chancre, according to Mr. B. Bell's experience, as three to one. It is obvious that the very reverse should happen, if the two diseases were produced by the same kind of matter.

I need not adduce other arguments, as the reader must be already acquainted with any worth knowing, from what is said in the previous part of the present article.

The grand practical consideration, depending on the possibility of the venereal disease arising from gonorrhœa, is, whether mercurials should not be exhibited, in all cases, with a view of preventing such a consequence.

Waving, on my own part, all attempts to decide the point, whether the matter of a chancre, and that of gonorrhœa, are of the same nature, I shall merely content myself with stating, that, as far as my observation and enquiries extend, the majority of the best practitioners of the present day consider the exhibition of mercury unnecessary, and, consequently, improper in cases of gonorrhœa. This fact almost amounts to a proof, that if venereal symptoms do ever follow a clap, they are so excessively rare, and, I may add, always so imputable to other causes, that the employment of mercury, as a prevention, would, upon the whole, do more injury than benefit to mankind; and this even admitting (what, in my mind, has never been unequivocally proved) that the matter of gonorrhœa is really capable, in a very few instances, of giving rise to the venereal disease.

The reader must weigh the different arguments himself. Some of Mr. B. Bell's reasoning is certainly untenable, as Sawrey has clearly shewn; but the latter, also, is not invulnerable in many points, which he strives to defend.

The reader is referred, for further information, to *A Treatise on the Venereal Disease, by John Hunter*; 1788. *Whately on the Gonorrhœa Virulenta*; 1801. *Practical Observations on Venereal Complaints, by F. Swediaur, M.D. edit.* 3. *An Enquiry into some of the Effects of the Venereal Poison, by S. Sawrey;* 1802. *Observations on Morbid Poisons, by J. Adams, M. D. edit.* 2. 1807.

GORGET. An instrument used in the operation of lithotomy, for the purpose of cutting the prostate gland and neck of the bladder, so as to enable the operator to introduce the forceps and extract the stone. It is, in fact, a sort of knife, at the end of which is a beak, that fits the groove of the staff, and admits of being pushed along it into the bladder.

Besides cutting gorgets, constructed for the preceding design, there are also blunt ones, intended to be introduced into the wound, when their concavity serves as a guide for the forceps into the bladder.

GRANULATIONS, (from *granum*, a grain.) The little grain-like, fleshy bodies, which form on the surfaces of ulcers, and suppurating wounds, and serve both for filling up the cavities, and bringing nearer together and uniting their sides.

Nature, in bringing parts as nearly as possible to their original state, whose disposition, action, and structure have been altered by accident, or disease; and after having, in her operations for this purpose, formed pus, she immediately sets about forming new matter, upon surfaces in which there has been a breach of continuity. This process is called *granulating*, or *incarnation;* and the substance formed is called *granulations.*

Granulations are an accretion of animal matter upon the wounded, or exposed surface; they are formed by an exudation of the coagulating lymph from the vessels; into which new substance, both the old vessels very probably extend, and in which new ones are formed. Hence gra-

nulations are very vascular; indeed, more so than almost any other animal substance. The vessels in granulations pass from the original parts to their basis, and thence towards their external surface, in tolerably regular parallel lines. The surface of this new substance has the same disposition to secrete pus, as the parts which produced it. The surfaces of granulations are very convex, the reverse of ulceration, having a great many small points, or eminences, so as to appear rough. The smaller such points are, the more healthy the granulations. The colour of healthy granulations, is a deep florid red. When livid, they are unhealthy, and have only a languid circulation. Healthy granulations, on an exposed or flat surface, rise nearly even with the surface of the surrounding skin, and often a little higher; but, when they exceed this, and take on a growing disposition, they are unhealthy, become soft, spongy, and without any disposition to form skin. Healthy granulations are always prone to unite to each other, so as to be the means of uniting parts.

Granulations are not easily formed on the side of an abscess, nearest the surface of the body.

They are not endowed with the same powers as parts originally formed. Hence they more readily ulcerate, and mortify. The curious mode in which granulations contract, when sores are healing, and even for some time after they are healed, we have explained in the article *Cicatrization*. (See *A Treatise on the Blood, Inflammation, &c. by John Hunter. p.* 473, *et seq.* 1794.)

GUAIACUM. (from an Indian word.) Many writers of the sixteenth century, contended that guaiacum was a true specific for the venereal disease; and the celebrated Boerhaave, in the eighteenth, maintained the same opinion. Mr. Pearson mentions, that when he was first entrusted with the care of the Lock Hospital, in 1781, Mr. Bromfield and Mr. Williams were in the habit of reposing great confidence in the efficacy of a decoction of guaiacum wood. This was administered to such patients as had already employed the usual quantity of mercury; but who complained of nocturnal pains, or had gummata, nodes, ozæna, and such other effects of the venereal virus, connected with secondary symptoms, as did not yield to a course of mercurial frictions. The diet consisted of raisins, and hard biscuit; from two to four pints of the decoction were taken every day; the hot bath was used twice a week; and a dose of antimonial wine and laudanum, or Dover's powder, was commonly taken every evening. Constant confinement to bed was not deemed necessary; neither was exposure to the vapour of burning spirit, with a view of exciting perspiration, often practised; as only a moist state of the skin was desired. This treatment was, sometimes, of singular advantage to those whose health had sustained injury from the disease, long confinement, and mercury. The strength increased; bad ulcers healed; exfoliations were completed; and these anomalous symptoms, which would have been exasperated by mercury, soon yielded to guaiacum.

Besides such cases, in which the good effects of guaiacum caused it to be erroneously regarded, as a specific for the lues venerea, the medicine was also formerly given, by some on the first attack of the venereal disease. The disorder being thus benefited, a radical cure was considered to be accomplished; and, though frequent relapses followed, yet, as these partly yielded to the same remedy, its reputation was still kept up. Many diseases, also, which got well, were probably not really venereal cases. Mr. Pearson seems to allow, that, in syphilitic affections, it may, indeed, operate like a true antidote, suspending, for a time, the progress of certain venereal symptoms, and removing other appearances altogether; but, he observes, that experience has evinced, that the unsubdued virus yet remains active in the constitution.

Mr. Pearson has found guaiacum of little use in pains of the bones, except when it proved sudorific; but, that it was then inferior to antimony, or volatile alkali. When the constitution has been impaired by mercury, and long confinement, a thickened state of the ligaments, or periosteum, or foul ulcers, still remaining, Mr. Pearson says, these effects will often subside, during the exhibition of the decoction. He says, it will often suspend, for a short time, the progress of certain secondary symptoms of the lues venerea; for instance, ulcers of the tonsils, venereal eruptions, and even nodes. Mr. Pearson, however, never knew one instance in which guaiacum eradicated the virus; and he contends, that, its being conjoined with mercury, neither increases the virtue of this mineral, lessens its bad effects, nor diminishes the necessity of giving a certain quantity of it. Mr. Pearson remarks, that he has seen guaiacum produce good effects in many patients having cutaneous diseases, the ozæna, and scrofulous affections of the membranes and ligaments. (See *Pearson on the Effects of Various Articles in the Cure of Lues Venerea. edit.* 2. 1807.

GUMMA, a soft tumour, so named from the resemblance of its contents to gums.

GUN-SHOT WOUNDS receive their name from the manner, in which they are produced, being generally caused by hard, obtuse, metallic bodies, projected from

cannons, muskets, or some other species of firearm. With such injuries, it is also usual to comprehend a variety of dreadful accidents arising from the explosion of shells, or the violence, with which pieces of stones from ramparts, or splinters of wood on board of ship, are driven about. Gunshot wounds are the most considerable of the contused kind; and what is to be said of them, will apply, more or less, to all contused wounds, according to the degree of contusion. They are particularly characterized by, what the French surgeons are fond of calling, a *disorganization* of their surface. The excessive contusion, or rather comminution, observable in gunshot wounds, depends upon the rapidity, with which the bodies, occasioning them, are propelled. The parts, touched by the ball, are converted into a blackish slough, the colour of which made our ancestors suppose, that bodies, projected by gunpowder, became heated, and actually burnt the flesh, with which they came into contact. But reason and experience have now proved, that whatever may be the rapidity of a projectile, it never acquires in its passage any perceptible heat. Indeed, a modern writer asserts, that such a degree of heat as would be requisite to make a ball burn partly in its passage, would really melt it. (*Richerand, Nosographie Chirurgicale, Tom.* 1, *p.* 217, *edit.* 2.) In general, gunshot wounds do not bleed, unless very large blood-vessels were injured; their circumference is often livid; and the shock, that attends their infliction, is particularly apt to occasion in the limb, or part, a kind of torpor, which, in many instances, extends itself to the whole system.

Until Ambroise Paré introduced more correct theories upon the subject, ideas, the most false, and errors, highly prejudical, prevailed both in the history and treatment of gunshot wounds. Cannon-balls and bullets sometimes produce most dreadful injury, without occasioning any breach of continuity in the integuments. This observation is so strictly true, that the muscles and bones may actually be crushed and broken to atoms, without the skin being at all wounded. Such cases were for a long while imputed to the violent motion, supposed to be communicated to the air by the ball itself. It was imagined, that this elastic fluid, being rapidly displaced by the shock of the projectile, was capable of making such pressure on surrounding bodies, as to destroy their texture. But how could this violent pressure originate in the midst of the open and unbounded air? If this theory were true, the effect in question would constantly happen, whenever a ball passes near any part of the body. The contrary, however, is so much the case, that pieces of soldiers and seamens hats, feathers, clothes, and even of their hair, are shot away in every battle, without any other mischief being done.

In consequence of the manner, in which such injuries of the soft parts and even of the bones, unattended with any breach in the skin, have been supposed to be produced, they have been erroneously termed *wind-contusions*. In fact, these cases are now universally acknowledged by all the most accurate observers never to proceed from the cause, to which formerly they were always ascribed.

The air does not move with the same rapidity as the ball; but its motion is less in proportion as it is a more subtile matter, and must be too feeble to account for such a violent degree of injury. The air, to which the ball must really communicate the greatest motion, is what is directly before it; and this never bruises the part untouched by the ball itself. It is only the air situated laterally to the shot, that is imagined to do injury, and it cannot be greatly agitated. The violent consequences of sudden explosions, and the effects produced on the organs of hearing, by strong commotions of the air, prove nothing relative to the point in question. Lastly, experience does not confirm the reality of such wind-contusions, for cannon-balls often tear off whole members, without the adjacent parts being in the least injured. (See *Le Vacher, in Memoires de l'Academie de Chirurgie, tom.* 4. *p.* 22.)

Neither can this kind of accident be attributed to an electrical shock on the parts, in consequence of the ball being rendered electrical by friction in the calibre of the gun, and giving off the electricity as it passes by. (Vide *Plenk's Sammlungen,* 1 *Theil. p.* 99.) Metals never acquire this property from friction.

The mischief, imputed to the air, is occasioned by the ball itself. Its producing a violent contusion, without tearing the skin, and entering the limb, is to be ascribed to the oblique direction in which it strikes the part, or, in other instances, to the feebleness, with which the ball strikes the surface of the body, in consequence of its having lost the greater part of its momentum, and acting principally by its weight, being, in short, what is called a spent ball. Daily observation evinces, that balls, which obliquely strike a surface, do not penetrate, but are reflected; though they may be impelled with the greatest force, and the body struck may be as soft and yielding as water. This alteration in the course of the ball, not only happens on the surface of the human body, but also in the substance of a limb which it has entered. A bone, a tendon,

&c. may change the direction of a ball which touches them at all obliquely. Hence it is manifest how it happens, that the track of a gun-shot wound is not always straight, and how balls sometimes run under the integuments nearly all round the body, or a limb.

The causes of several of the peculiarities, attending gun-shot wounds, as Mr. Chevalier has observed, are to be sought among the laws, by which moving bodies are governed, and by which, the mechanical effect of a ball, propelled against any part of the body, must therefore be determined. The form, the momentum, and the direction of the shot, that is received; the position, and the variety of structure, or, in other words, the variety of density and powers of resistance, in the part receiving it, must always be considered, in order to account satisfactorily for the effects, which it produces.

The first law, to which this gentleman begs the attention of his reader, is, that a body in motion, striking against any substance, will communicate a part of its momentum to the substance, against which it strikes, and that this communication will be in a direct ratio to the powers of resistance, which that substance possesses at the time; whether such power of resistance be derived from its own density, or bulk, or force of cohesion, or momentum acting in a different direction. Hence, if the resistance be equal, or superior to the momentum, the motion will be stopped; the momentum, in this case, being equally divided between the body impelled and the body resisting. If the resistance be inferior, the motion will only be lessened; and if, besides being inferior, and therefore incapable of stopping the moving body, it also operates in a different direction, the future line of motion will likewise be changed, and fly off from the point, at which it meets with resistance, in a line, which will form an angle with that of the original direction, in which it moved.

Mr. Chevalier next reminds his reader, that the resistance, made by any substance to the motion of another, will be greater, or less, *cæteris paribus*, as the angle of incidence approaches to, or recedes from a right angle; and, if it be reflected, and the motion be continued in the same medium, the angle of reflection will always be equal to the angle of incidence.

The resistance, made to a moving body, by the density of any medium, in which it moves, will be, *cæteris paribus*, as the surface of the moving body presented to that medium.

A dense medium forms a continued resistance to a body propelled with any given velocity; and, therefore, the more dense the medium, the greater the resistance, and the sooner the original momentum will be overcome by it.

A shot, moving through any medium of uniform density, will also be acted on by the attraction of gravitation, so as to be continually changing the direction in which it moves; and, if it move in vacuo, or in air, it will describe the curve called a parabola. The commencement of this curve does not take place at the point, at which the gunpowder explodes; for, within the barrel, and to some distance beyond it, the shot moves forward in a right line, called the *line of the impulse of fire*, (*Helsham's Lect.* 2, *p.* 187;) which line will extend farthest horizontally, the less the angle of elevation of the piece recedes from an horizontal line.

The less of the original impulse is left in a shot still moving, the more liable will it be to be stopped, or turned out of its course by any given resistance.

Every new resistance, which a shot in motion meets with, as Mr. Chevalier has remarked, will operate so as to produce not only a diminution of its momentum, but, also, a change in its direction; every fresh resistance being in fact equivalent to a fresh power, acting in a different line from that, in which the shot was previously moving.

As a body, acted on at once by two powers, will not move in the direction of either, but, in the diagonal of a parallelogram, of which two sides are formed by the direction and momentum, given by each of those powers respectively, so every change of impulse, or resistance, will cause the body to move in so many changes of direction, till at length its momentum is overcome, and it becomes quiescent.

A continued resistance from a dense medium will be a continued application of a power, the uniform and equable operation of which will cause the motion to be curvilinear, the reason of which is sufficiently explained by writers on projectiles.

Mr. Chevalier next proceeds to explain, that a shot, or other hard body, falling upon a soft one, as, for example, an adipose membrane, or muscle, and stopping there, or lodging in it, still acts in conformity to the same general laws, and stops only from the resistance it meets with. If this resistance is made only by the force of cohesion in the adipose membrane, or muscle, so much of that cohesion is overcome, as was equal to the momentum of the shot, when it impinged against it; and, therefore, so far, and only so far, is its substance broken through or destroyed.

It is only on such principles, that we can explain the intricate and varied course and effect of balls in parts of diversified structure, consisting of substances differ-

ing in density and powers of resistance. And, though, says Mr. Chevalier, in many cases, a mathematical explication of the course of a ball cannot be given; this arises entirely from the want of data, the laws of matter being fixed and immutable. But, when the data are known, as, for instance, the velocity and direction of the shot, the position of the patient, or of the wounded part at the time of the accident, and the structure of the parts penetrated, a much more probable conjecture of the course of the ball may generally be formed, than if these circumstances had not been regarded.

From the foregoing account, as Mr. Chevalier further notices, we may see the reason of the concussion, or shock, which is given, in many instances, to the whole system by gun-shot wounds, and which is represented by the best writers on this subject, to be often attended with grave and even alarming effects, extending not only over the injured part, but affecting the system at large. For, as the resistance to the shot is afforded not only by the texture of the injured part, but, also, in some degree, by the connexion, which this has with other parts, and with the whole body, these latter will likewise participate in the violence; and they will do it so much the more, in proportion as the part immediately wounded has, from its attachments, its texture, elasticity, or importance to life, a greater connexion with the stability, or with the functions of the rest. Hence, a shot, striking against a tendon, or a bone, in one of the extremities, will produce a greater concussion, than if it struck only against softer parts.

A shot, striking against a muscle in action, will produce more concussion, than if it struck against the same part of the same muscle at rest. And a shot, striking the head, or wounding the liver, lungs, or intestinal canal, will generally bring on instantaneous derangement of the whole system, with which the functions of these parts are so closely connected. To all this must be added an alarm, which takes sudden possession of the mind, and is increased by the uncertainty of the patient about his real state. Such apprehension, the most determined courage, is not always able to withstand. (See *a Treatise on Gun-shot Wounds, by Thomas Chevalier, Part* 1. *sect.* 7.)

A ball, when it strikes a part of the body, may cause four kinds of injury. 1. It may only occasion a contusion, without penetrating the part, on account of its being too much spent, or of the oblique way in which it strikes the surface of the body. 2. It may enter and lodge in the surface of a part; in which case, the track of the wound has only one aperture. 3. It may pierce through and through; and then there are two openings, one at the entrance, the other at the exit of the ball. The circumference of the aperture, where the shot entered, is usually depressed: that of the opening, from which it came out, elevated. At the entrance, there is commonly more contusion than at the exit of the ball. The former is generally narrower; the latter wider, and more irregular, especially when the round smooth figure of the ball has been changed by its having struck a bone. 4. A cannon-ball may tear off a whole limb. (*Richter's Anfangsgründe der Wundarzneykunst, Band* 1.)

Gun-shot wounds differ very much, according to the kind of body projected, its velocity, and the nature and peculiarities of the parts injured. The projected bodies are mostly bullets, sometimes cannon-balls, sometimes pieces of broken shells, and very often, on board of ship, splinters of wood. From the contusion, which the parts suffer, on the violent passage of the ball through them, there is most commonly a part of the solids surrounding the wound deadened, which is afterwards thrown off in the form of a slough, and which prevents such wounds from healing by the first intention, and makes most of them necessarily suppurate. This does not take place equally in every gun-shot wound, nor in every part of the same wound; and the difference commonly arises from the variety in the velocity of the body projected; for, where the ball has passed with little velocity, which is sometimes the case at their entrance, but, still more frequent at the part last wounded, the injury may often be healed by the first intention. (*J. Hunter, p.* 523.)

Foreign bodies are more frequently met with in gun-shot wounds than any others, and are commonly of three kinds 1. Pieces of clothing, or other things, which the ball forced before it into the limb. 2. The ball itself. 3. Loose splinters of bone. It is only when the ball strikes a naked part, touches no bone, and goes through and through, that the wound can be free from extraneous matter. Foreign bodies are the cause of numerous unfavourable symptoms, by irritating sensible parts, and exciting pain, inflammation, convulsions, hemorrhage, long suppurations, &c. They are constantly more productive of such evils, the more uneven, pointed, and hard they are. Hence spiculæ of bone are always the most to be dreaded. (*Richter.*)

When a ball strikes a bone, the concussion produced is another occasion of bad symptoms, to be added to those already mentioned. When slight, its effects are confined to the injured limb. Sometimes they extend to the neighbouring joints, in which they produce inflammation and abscesses.

It is commonly stated, in surgical books, that when a cannon-ball tears off a limb, it produces a most violent concussion of the whole body, and a general derangement of all its functions. This, however, is by no means always true. I have lately seen, in London, a young sailor, whose arm was completely torn off at the shoulder, by a cannon-ball from one of the forts at Guadaloupe, in March 1808; he suffered no dreadful concussion of his body, nor were his senses at all impaired. This case was very remarkable, as the scapula was so shattered, that Mr. Cummings, of Antigua, was under the necessity of removing the whole of it. The patient recovered in two months. From the account I heard, I do not believe the axillary artery bled immediately after the accident. The young man was lately shewn to the gentlemen of St. Bartholomew's Hospital, quite well.

There is one curious effect which occasionally follows gun-shot wounds; but, I do not pretend to understand the rationale of it: viz. inflammation and suppuration of some internal viscus, especially of the liver. Several such cases are related in the *Mem. de l'Acad. de Chirurgie.*

From the circumstance of the inner surface of gun-shot wounds being more or less deadened, they are late in inflaming. But when a ball has fractured a bone, which fracture has occasioned great injury of the soft parts, independently of that caused immediately by the ball itself, the inflammation will come on as quickly, as in cases of compound fracture; because the deadened part bears no proportion to the laceration or wound in general. (*J. Hunter, p.* 524.)

From the same circumstance of a part being often deadened, gun-shot wounds frequently cannot be completely understood in the first instance, for, in many cases, it is at first impossible to know what parts are killed, whether bone, tendon, or soft part. Nor can this be ascertained till the slough separates, which often makes the wound much more complicated than was previously imagined. For, very often, some viscus, or a part of some viscus, or a part of some large artery, or even a bone, has been killed by the violence. If a piece of intestine has been killed, the contents of the bowel will begin to come through the wound when the slough separates. If a portion of a large blood-vessel be killed, a profuse, and even fatal hæmorrhage may come on, when the slough is detached, although not a drop of blood may have been previously lost. (See *Hunter, p.* 525.)

When the ball moves with little velocity, the mischief is generally less; the bones are not so likely to be fractured; the parts are less deadened, &c. However, when the velocity is just great enough to splinter a bone, which is touched, the splintering is generally more extensive, than if the impetus of the ball had been much greater, in which case, it would rather have taken a piece out. When the ball moves slowly, it is more likely to be turned by any resistance it may encounter in its passage through parts, and hence the wound is more likely to take a winding course.

When a ball enters a part with great velocity, but is almost spent, when it comes out again in consequence of the resistance it has met with, there may be a good deal of sloughing about the entrance, and little or none about the exit, owing to the different degrees of celerity with which the ball traversed the parts. (See *Hunter.*)

Gun-shot wounds may have either one, or two apertures, according as the ball has lodged, or passed quite through the part. In some cases, the openings are diametrically opposite each other; in others they are not so, the direction of the ball having been changed by the resistance, which it has met with from a bone, cartilage, tendon, &c. Thus a ball has been known to enter just on the inside of the ankle, and come out near the knee, to enter the fore-head and come out at the temple, &c. (*Richerand, Nosographie Chirurgicale, Tom.* 1, *p.* 219, *Edit.* 2.) The opening, where the ball enters, is always smaller than that from which it escapes, and its margin is forced inwards, while the circumference of the other aperture is quite prominent. The contusion and injury, which the parts suffer, are also greatest about the entrance of the ball, owing to the more considerable impetus, with which it moves. The yellowish livid hue, around gun-shot wounds, is a sort of ecchymosis, or extravasation of blood. The injured member is often benumbed and stupefied, and, when mortification occurs, it spreads with extraordinary rapidity. When the whole constitution is thrown into this kind of torpor, the most fatal consequences are to be apprehended. " C'est dans cet état, (says Richerand) que mourut le chevaulége, dont parle Quesnay; l'état d'hébêtude était tel, que cet individu à qui l'on proposa l'amputation de la jambe, répondit que ce n'était pas son affaire." (*Nosographie Chirurg. Tom.* 1, *p.* 221, *Edit.* 2.) In cases of gun-shot wounds, sudden shiverings, syncope, and nervous symptoms are not unfrequent. Such occurrences, with other bad effects, made the ancients suspect, that something poisonous was carried into the wound; an opinion, which is now well known to be erroneous.

When there is only one opening, we

may infer, that the wound contains a foreign body. When there are two apertures, the ball has escaped; but, pieces of the clothes, &c. may still be lodged in the part.

As the ends of the torn vessels are contused and compressed, gun-shot wounds have little propensity to bleed much, and, unless very considerable vessels are lacerated, they do not bleed at all: sometimes not in this case. The greatest danger of bleeding is always when the dead parts are detached, eight or ten days after the injury. Angular uneven bodies, such as pieces of iron, cut lead, &c. are more liable to occasion far more dangerous wounds, than round even bodies, like leaden bullets. Wounds occasioned by a small shot, are frequently more perilous, than others produced by larger balls: because their track is so narrow, that it cannot be traced, nor consequently the extraneous body itself extracted. Such a shot oftentimes injures a viscus, when there is not the smallest external symptom of the occurrence. Sometimes a great part of the danger, also, arises from the number of the shots which have entered.

In a subsequent section of this article, the valuable observations of M. Larrey, upon the question of amputation, in cases of gun-shot wounds, will be fully detailed.

TREATMENT OF GUN-SHOT WOUNDS.

The first thing in the treatment of a gun-shot wound in one of the extremities, is to determine, whether it is most advisable to amputate the limb immediately, or to undertake the cure of the wound. When a bone, especially at a joint, is very much shattered; when the fleshy parts, particularly the great blood-vessels and nerves, are lacerated; when the whole limb has suffered a violent concussion, and is cold and senseless; there is no hope of preserving it. In this case, it is the surgeon's duty to amputate at once, and not to delay till mortification commences. But, besides this violent degree of injury, in which the propriety of amputation is obvious, there are several lower degrees, in which it is often a difficult thing to decide whether amputation is necessary or not. Here the surgeon must look not only to the injury, but also to the patient's constitution, and even to external circumstances, such as the possibility or impossibility of procuring good accommodation, rest, attendance, and pure air. But it is impossible to determine the necessity of amputation by general rules. In every individual case, the surgeon must consider maturely the particular circumstances, before he ventures to decide. The grounds against the operation are; the pain which it causes at a period when the whole system is disordered by a terrible injury; the privation of a limb; and frequent examples, in which nature, aided by judicious surgery, repairs the most horrible wounds. The following are the reasons in favour of the operation. By it the patient gets rid of a dreadful contused wound, which threatens the greatest peril, and which is exchanged, as it were, for a simple incised one. The pain of amputation is not of more moment than the pain which the requisite incisions, and the extraction of foreign bodies, would cause in case the operation is abandoned. The wound of amputation is not so much to be apprehended, as experience shews, that incisions, in cases of gun-shot wounds, are not only exempt from particular danger, but are often useful. The loss of the limb cannot be taken into the account; for, the surgeon only undertakes the operation where he designs to save the patient's life by that privation, and anticipates that the part itself cannot be preserved. Even, if he should deprive the patient of a limb, that, perhaps, might have been preserved, there is this atonement, that he can furnish him with an artificial leg, which often proves far more serviceable, than the lost limb would have proved, had it been preserved. Should the operation be fixed on, it is to be immediately performed above the wound. (*Richter's Anfangsgrunde der Wundarzneykunst, Band* I.)

When amputation is deemed unnecessary, the surgeon, according to customary precepts, is to enlarge the wound by incisions. Such a dilatation has been said to have numerous advantages; to facilitate the extraction of foreign bodies; to occasion a topical bleeding, and afford an outlet for the extravasated fluid in the circumference of the wound; to convert the fistulous form of the track of the ball into an open wound; and, lastly, to divide ligamentous aponeuroses, which otherwise might give rise to spasmodic and other untoward symptoms.

More modern experience, however, shews (*Hunter, p.* 529.) that the utility of such incisions has been overrated; that they generally increase the inflammation, which, in these cases is so much to be apprehended; that wounds which are not dilated, commonly heal more speedily, than others which are; and, that there are only a few cases, in which incisions are beneficial.

The cases of gun-shot wounds are various. Sometimes the track of the ball lies superficially under the skin, and only has one opening. When it lies in soft parts, and the ball has neither touched a bone, nor a considerable blood-vessel, all incisions are useless, let the wound have

one or two apertures. Though dilating the wound has been practised with a view of giving vent to matter, eschars, and foreign bodies, and even its whole track has been laid open, when superficial; yet, experience proves the inutility of such steps. As in the skin there is a real loss of substance, arising from a portion being driven inward before the ball, it follows, that the opening of a gun-shot wound must be more capacious than that of a punctured one. By the separation of sloughs, the wound becomes still more dilated, so that not only matter, but foreign bodies which approach the skin, may easily find an exit. Besides, incisions commonly close again very soon, and in a few days the wound falls into the same state, as if no dilatation at all had been made.

When a cannon-ball has torn off a limb, some advise the amputation of the stump, to procure the patient an even smooth incision, instead of an irregular, jagged, and highly dangerous wound. As the limb has commonly suffered a violent concussion, is almost bereft of sense, and power of motion, and the bone frequently has a fissure extending some way upward, the amputation is also recommended to be done, if possible, above the nearest joint. Others condemn the operation in this instance, asserting, that such wounds may sometimes be healed, and that the constitution, immediately after such violence, is not in a favourable state for submitting to such a painful measure. But, as when the operation is not done, this kind of injury requires large and free incisions, for the extraction of foreign bodies, the shortening of projecting muscles and tendons, the discharge of extravasated fluids and abscesses; and, as these incisions are likely to occasion at least as much irritation as amputation itself, without being productive of equal good, the last objection is not very weighty. The operation may, also, in many cases, be delayed until the immediate irritation of the injury on the system is over. The occasional healing of such wounds only proves, that it is not altogether impossible, in every instance, to effect a cure without amputation. The surgeon can the more readily make up his mind to amputate in this case, as it does not occasion the loss of a limb. However, it is very credible, that the injury may sometimes be so conditioned, and the circumstances in which the patient finds himself such, that there are good grounds for deeming the operation unnecessary, and even pernicious. No one would be justified in amputating above the knee, when the limb is injured at the foot or ankle.

In gun-shot wounds, ligamentous fibres, and fasciæ, are often found going quite across them. It is advised to divide such parts completely, lest, when the wound inflames, they should cause violent spasms and nervous symptoms, and afterwards impede the discharge of matter and foreign bodies. No doubt this counsel is judicous. However, it is frequently difficult, at first, to discover and divide such parts, and then it is better to defer the incision until one can easily get at them without irritating the wound, and it is manifested, that their remaining undivided is the cause of inconvenience. These remarks are, also, applicable to membranous expansions perceptible at the sides of the wound, and to entire fasciæ, stretched over the inflamed muscles.

The extraction of foreign bodies ranks as one of the most urgent motives for the dilatation of the wound, and, no doubt, it is right to remove, at first, as many of them as possible. Their lodgment irritates the wound, causes violent nervous and inflammatory symptoms, and copious suppuration; circumstances which the timely extraction of them may prevent. Yet, let it be remembered, that the extraction of foreign bodies is frequently attended with immense irritation, and that, while they lie too firmly fixed in parts, it is often a matter of impossibility. After the sloughs have separated, and the wound has become widened, suppuration frequently does not prevail long before the extraneous substances become loose, spontaneously approach the skin, and easily admit of removal without any dilatation. In cases, where, from necessity, foreign bodies have not been removed at first, no disadvantages have occasionally resulted from their continuance.

Hence, it is prudent, at first, to extract only such foreign bodies as are near the external opening, quite loose, and removeable without much irritation; or such as press on parts of importance, and, thereby excite dangerous symptoms. The surgeon should avoid interfering with those which are deeply and firmly lodged in the wound. He should await suppuration, and the detachment of sloughs, and when the foreign bodies become moveable and apparent, he should extract them, with or without an incision, as circumstances may demand. The examination of the wound ought to be made as much as possible with the finger, which irritates less, and feels more distinctly, than a probe. A great variety of instruments have been devised, either for ascertaining the position of balls, and other foreign bodies in gun-shot wounds, or for extracting them. But, however numerous and diversified bullet-drawers may be, they all admit of being divided into three kinds. The first are constructed on the principle of a pair of forceps. Others

are shaped more or less like spoons. And a third description are made on the plan of a cork-screw, or worm. These last are only designed for cases, in which the ball is fixed in the substance of a bone, and is quite immoveable; for, if it were lodged in the soft parts, the pressure, requisite for introducing the screw into it, would injure and lacerate the parts at the bottom of the wound. Bullet drawers, constructed on the plan of forceps, have the inconvenience of not being adapted for saizing the ball, unless their blades are expanded, which always stretches the wound, and creates a great deal of irritation. Forceps have been contrived with blades, which can be introduced separately, and then joined together with a screw. I do not know, whether there is any such instrument, that will grasp a ball, without being first expanded; but, it might easily be made, and would be found advantageous in military practice. Perhaps, when a ball lies superficially, the fingers, or a small pair of forceps, will serve to extract it most conveniently. In many other examples, bullet drawers, constructed on the principle of a spoon, are the best, that can be used. Richerand speaks of a superior instrument, for the extraction of balls, as follows: "De tous ces instrumens, le meilleur sans doute, est celui de mon illustre collègue dans la chaire de Pathologie Chirurgicale, M. Percy, ce chef si distingué de la chirurgie militaire. Son tireballe offre la réunion des trois genres; il remplit à la fois l'office de pinces à forceps, de cuillier, et de tirefond." (*Nosographie Chirurgicale, Tom.* 1, *p.* 223, *Edit.* 2.)

The event of the treatment above recommended, is various. Extraneous substances remaining in the wound, either loosen gradually, and come into view so as to be easily removeable; or they continue concealed, prevent the cure, and give birth to a fistulous ulcer. In some instances, the wound closes, and the foreign bodies remain in the limb during life, without inconvenience; and, in other cases, after a time, they bring on a renewal of inflammation and suppuration. Sometimes a foreign body varies its situation, sinking down, and afterwards making its appearance at a different part, where it may excite inflammation and suppuration.

When the ball lodges in the wound, it is usually difficult to trace it, as the parts collapse after its passage. The ball does not regularly take a straight direction through the injured part, but, oftentimes, a very tortuous one. The latter circumstance is more apt to occur, as the ball is more spent. In every case, in which it is not easily discoverable, all painful examinations should be abandoned, and the foreign body left in its situation, where it rarely creates any trouble.

Sometimes, the ball may be both easily found and extracted. At other times it lodges on the opposite side of the limb, closely under the skin. If the integuments, under which the ball is lodged, should be so contused that they will probably slough, they are to be considered as already dead, and an opening is to be made in them for the extraction of the ball. But when the ball lies so remotely from the skin that it can only just be felt, and the skin itself is quite uninjured, no counter-opening ought to be made. The wound heals better when the ball is left in, and far less inflammation takes place in the vicinity of this extraneous body, than about the orifice of the wound. A counter-opening always renders the inflammation at the bottom of the wound, as great as at its orifice. It is better to let the wound heal up, and extract the ball afterwards. (See *Hunter, p.* 541.)

Sometimes the ball penetrates the spongy part of a bone, and lodges firmly in it. When it has only entered superficially, it may sometimes be loosened and extracted, by means of an elevator with a thin and somewhat curved extremity, and when it is more firmly fixed, a screw bullet drawer will sometimes serve for its removal. Should the attempt fail, hope may still be entertained, that, when suppuration takes place, it will become loose, and admit of extraction. In case nothing of this kind should occur, some advise the employment of a trepan to remove the ball from its situation. As this cannot be done without great irritation, and experience proves that a ball may lie in a bone during life, without occasioning unpleasant symptoms, it is obviously preferable to allow it to remain. (*Richter's Anfangsgr. der Wundarzn. Band* 1.)

Besides these principal circumstances, there are various contingent ones, which often demand a particular mode in making the incisions, and in the subsequent management. To explain them all here is impossible. Hemorrhage from a torn artery of considerable magnitude, for which a ligature is necessary, may require incisions to get at the vessel.

As soon as the requisite incisions are made, and foreign bodies extracted, the prime objects in the treatment of gun-shot wounds are then accomplished, and the rest is, in reality, not different from the surgery of other wounds.

With regard to probing gun-shot wounds; when it is evident that the shot has passed out, and no particular object can be fulfilled by introducing an instrument, it is often better to dispense with such examinations, at least till suppuration has come on. Introducing any in-

strument is generally productive both of pain and irritation. But when the ball, or any other extraneous substance, has lodged in the wound, and its situation is not immediately evident, it will often be advisable to search for it at once, that in order, if its situation will allow, it may be extracted before inflammation begins. The surgeon, therefore, considering all the circumstances which can assist him in forming a reasonable conjecture of the course of the wound, must give to a probe that curvature, or form, which he thinks most likely to pass readily along it, and must then proceed to make the examination. But, when this is very painful, and the course of the wound obscure, it will often be better to desist, and renew the search when suppuration has taken place, when it can be undertaken with more ease, and a greater prospect of success. When gun-shot wounds are inflamed, the tenderness and swelling of the parts are peculiarly strong reasons against painful probings, or efforts to extract foreign bodies, as long as this state lasts. (See *Chevalier's Treatise on Gun-shot Wounds, p.* 67, 68, *Edit.* 3.)

There is no fact in the practice of surgery better established, than that the cramming of narrow stabs and gun-shot wounds with lint is particularly hurtful. The only possible reason for doing so in the latter cases must be to keep the orifice of the wound from healing up, and confining extraneous bodies, matter, &c. The apprehension of this happening at first is quite unfounded; for the inside of the mouth of the injured part is lined with a slough or eschar, which must necessarily be detached before the parts can heal. The first dressings, therefore, should be quite superficial, and of a mild unirritating nature. Hunter used to employ fomentations, pledgets of simple ointments, and, frequently, over the latter an emollient poultice. In the suppurative stage of gun-shot wounds, poultices are also the best applications, and a little piece of lint may be gently introduced into the mouth of the wound in order to preserve an outlet for the matter, extraneous bodies, and sloughs, which are making their way outward.

Possessing these ideas, I cannot altogether approve the following directions, though they are certainly better than are given in many surgical books. "A small bit of soft lint may be placed lightly between the lips of the wound, *in order to keep it from closing*. In some instances, it should be introduced a little beyond the lips, *in order to conduct off the fluids effused, and to prevent irregular adhesions from forming near the surface during the inflammatory stage*; as these would impede the direct exit of the discharge. But the wound is not to be filled with lint, much less crammed with it. A pledget of some simple ointment being then laid on, with tow or cloths to receive the discharge, and these prevented from coming off by a bandage loosely applied, the patient may be put to bed, and so placed, if possible, as to keep the orifice of the wound dependent." (*Chevalier, p.* 125, 126.) The reasons for what I consider objectionable, namely, introducing lint on first dressing the wound, are too frivolous to need comment.

When the track of the ball has two apertures, some advise a seton to be drawn through it, with a view of preventing a premature closure of the wound, and introducing proper applications. A seton is, also, imagined to give free vent to pus, and to promote the evacuation of foreign bodies. But a gun-shot wound is little inclined to close prematurely, and a seton rather obstructs the exit of pus, and may as easily push foreign bodies deeper, into the limb as out of it. There are preferable modes of applying the necessary remedies, and, as a seton is an extraneous substance itself, its employment must be deemed pernicious.

Gun-shot wounds require, in general, the employment of antiphlogistic means, just as other cases attended with equal inflammation do. When they are in the inflamed state, the application of leeches is highly proper.

Bleeding is recommended in these cases, and in such a manner, as if it were of more service in them than wounds in general. But the necessity for the practice is really not greater than in other wounds which have done the same degree of mischief, and from which the same quantity of inflammation and other consequences are expected. Bleeding is certainly proper here, just as it is in all considerable wounds attended with a strong full habit, and great chance of extensive inflammation, and much symptomatic fever. In every instance, however, the practitioner must take particular care not to be too bold in the practice of bleeding; for when the patient is reduced below a certain degree, his strength is inadequate to support the large and long-continued suppurations which often cannot be avoided. (See *Hunter, p.* 563, 564.)

As the orifices of the vessels torn by the ball, are compressed, and, as it were obliterated, considerable hemorrhage is seldom remarked at first. But, after some days, and frequently at a very late period, when the sloughs separate, very copious hemorrhages are apt to occur, which are the more dangerous as they come on unexpectedly, and, oftentimes, when the

suppuration has already induced great debility. A sense of heaviness, throbbing, and plethora, at the wounded part, often announces the approach of such an event. The surgeon himself may occasion the bleeding, by removing the dressings carelessly. Hence, in every case, where there is reason to apprehend from the situation of the wound, that a considerable vessel is injured, the patient must be constantly and attentively watched, and every thing necessary for the immediate stoppage of the hemorrhage must be provided.

Another kind of hemorrhage, still more dangerous than the former, particularly occurs in such gun-shot wounds, as have long been in a state of copious suppuration. The blood does not issue from one individual vessel, but from the whôle surface of the wound, as from a sponge, and is so thin as to resemble blood and water. This hemorrhage is very dangerous, because it is particularly apt to exhaust the patient, who is already extremely debilitated, and its causes are difficult of removal. The case demands the exhibition of bark, alum, and diluted sulphuric acid. Decoctions of bark, and muriatic acid, may, at the same time, be applied to the wound. (*Richter.*)

Sometimes, in gun-shot wounds, the inflammation lasts very long, and there is no appearance of suppuration. In other instances, fresh inflammation comes on suddenly, during the suppurative stage, without any evident cause, and puts a stop to the secretion of matter. Sometimes the wound suppurates to an extraordinary degree, without any perceptible reason. All these circumstances often depend on splinters of bone remaining behind, which should be extracted as soon as it is practicable. (*Richter.*)

For the first days, the matter seldom assumes a healthy appearance; but as soon as the sloughs separate, it then becomes of a proper quality, and the wound is to be treated as a simple abscess.

Sometimes the healing process does not commence, after suppuration has prevailed for a considerable time. On the contrary, notwithstanding the exhibition of tonics, and a generous diet, the suppuration ceases to proceed vigorously, and the wound becomes unhealthy, and the matter thin. The bones shew no disposition to unite, and the patient, reduced by hectic symptoms, is rapidly advancing to dissolution. In this state, life may sometimes be preserved by amputation; the *anceps*, but *unicum remedium*. We ought never to be deterred from undertaking the operation by the fever and weakness, which frequently soon disappear when the local cause is removed.

OF AMPUTATION IN CASES OF GUN-SHOT WOUNDS.

I think a section upon this subject well deserves a place in the present article, more especially, as I am informed, that this dictionary is in the hands of a vast number of military and naval surgeons, and the generality of practitioners are not sufficiently impressed with the advantages of *immediate* amputation in every instance, in which the operation is considered indispensable.

After the battle of Fontenoy, in the year 1756, the Royal Academy of Surgery in France offered a prize for the best dissertation on the gun-shot injuries requiring immediate amputation, and on other cases of the same nature, where the operation, though deemed inevitable, might be delayed. "*L'amputation étant absolument nécessaire dans les playes compliquées de fracas des os, et principalement celles qui sont faites par armes à feu, déterminer les cas où il faut faire l'opération sur le champ, et ceux où il convient de la différer, et en donner les raisons.*" The prize was adjudged to the dissertation of M. Faure, the main object of whose paper was to recommend delaying the operation. "The practice of M. Faure (says a critical writer) is followed by the most eminent surgeons of the present day in this country; it is recommended by Mr. John Hunter, in his treatise on gun-shot wounds; the support, however, which it derives from the notice of Mr. Hunter, arises more from the authority of his name, than from the strength of his arguments in its favour. That part of Mr. Hunter's work is, in our opinion, the weakest of all his practical writings. *The propriety of immediate amputation, when its necessity is admitted to be sooner or later unavoidable, is enforced by writers, whose experience gives considerable importance to their opinions. Suffice it to name Le Dran, Ranby, Kirkland, and Larrey.*" (*London Med. Review, No.* 15, *p.* 244.)

Although in France, the academy of surgery thought proper to decree the prize to M. Faure, whose doctrine thus received the highest approbation, yet, in that country, very opposite tenets were set up by some men of distinguished talents and extensive military practice. M. La Martinière in particular wrote some excellent arguments in reply to M. Bilguer; arguments, which, I think, would do honour to the most accomplished surgeon of the age, in which we live. (See *Mémoire sur le traitment des plaies d'armes à feu, in Mém. de l'Acad. de Chirurgie, Tom.* 11, *p.* 1, *Edit. in* 12*mo.*) M. Boucher, of Lisle, was an advocate for the same side of the question. (See *Obs. sur des plaies d'armes à feu, &c. in Mém. de l'Acad. de Chirurgie, Tom.* 5, *p.* 279,

&c. *Edit. in* 12*mo.*) And, of late, M. Larrey has proved most convincingly, that when amputation is to be done in cases of gun-shot wounds, nothing is so pernicious as to delay the operation. (See *Mémoires de Chirurgie Militaire, Tom.* 2, *p.* 451, &c.)

It becomes me here to state, that the principles, inculcated by M. Larrey, are, in point of fact, the same as those, which were so strenuously insisted upon by Mr. Pott, whose principal remarks on the necessity of amputation in certain cases, are detailed in another part of this publication. (See *Amputation.*) Mr. Pott, indeed, was not an army surgeon, and what he says, was not particularly designed to apply to military practice; but, he has represented, as well as any body can do, the propriety of immediate amputation for injuries, which leave no doubt, that such operation cannot be dispensed with.

The strongest body of evidence upon this matter, however, is adduced by M. Larrey, whose situation at the head of the medical department of the French armies has afforded him most numerous opportunities of judging from actual experience. "Upon this subject, (says he) now that twenty years of continual war have carried our art to the highest pitch of perfection, there can only be one opinion. It is after having incessantly directed the medical service, all this time, in quality of head surgeon and inspector-general of the armies, that I proceed to discuss the different opinions delivered in the academy, and to settle definitively this great question, which I regard as the most important in military surgery.

"If we are to be told, that the amputation of a limb is a cruel operation, dangerous in its consequences, and always grievous for the patient, who is thereby mutilated; that, consequently, there is more honour in saving a limb, than in cutting it off with dexterity and success; these arguments may be refuted by answering, that amputation is an operation of necessity, which offers a chance of preservation to the unfortunate, whose death appears certain under any other treatment; and, that if any doubt should exist of amputation being absolutely indispensable to the patient's safety, the operation is to be deferred, till nature has declared herself, and given a positive indication for it. We are also justified in adding, that this chance of preservation is at the present day much greater, than at the epoch of the academy of surgery. We learn from M. Faure, that, of about three hundred amputations, performed after the battle of Fontenoy, only thirty were followed by success, whilst, on the contrary, says M. Larrey, we have saved more than three-fourths of the patients, on whom amputation has been done, and some of whom also had two limbs removed. This improvement is ascribed by M. Larrey, 1st, to our now knowing better how to take advantage of the indication and favourable time for amputating. 2. To the dressings being more methodical. 3. To the mode of operating being more simple, less painful, and more expeditious, than that formerly in vogue."

OF IMMEDIATE AMPUTATION.

When a limb, that has received a gun-shot wound, cannot be saved, amputation should be practised immediately. The first four and twenty hours, as M. Larrey observes, are the only time that nature remains tranquil, and, as in all dangerous cases, we must hasten to take advantage of this period, in order to administer the necessary remedy.

In the army, a variety of circumstances make the urgency for amputation still greater. 1. The inconvenience attending the transport of the wounded, from the field of battle to the military hospitals, in carriages badly suspended, the jolting of which would produce such disorder in the wound, and in the whole body, that most patients would die in the journey, especially if it were long, and the weather either extremely hot or cold.

2. The danger of a long continuance in the hospitals; a danger, which amputation materially diminishes, by changing a gun-shot injury into a wound, that may be speedily healed, and reducing the causes of fever, and the hospital gangrene.

3. The cases, in which there is a necessity for abandoning the wounded. In this circumstance, it is of importance to have amputated, for, after the operation, the patients may remain some days without being dressed, and the dressings are afterwards more easy. Besides, it might often happen, that these unfortunate objects would not meet with surgeons of sufficient skill to do the operation; a circumstance, says M. Larrey, that we have seen happen among certain nations, whose caravans, for the medical service of the army (*ambulances*) are not constructed like those in use with the French.

OF CASES, IN WHICH AMPUTATION SHOULD BE DONE IMMEDIATELY.

First case. A limb carried away by a cannon-ball, or the explosion of a howitzer, or bomb, requires amputation without any loss of time: the least delay puts the patient's life in danger.

The skin has been violently stretched and lacerated; the muscles have been ruptured and irregularly torn away; the tendons and aponeuroses lacerated; the nerves and vessels divided and forcibly dragged; lastly, the bones broken and smashed to a greater or lesser extent. These first effects are followed by a general, or partial commotion; by a kind of torpor in the injured part, and a good way above the wound; by a painful trembling in the remains of the member, an event, that is singularly afflicting to the patient; and by a local swelling, preceding the erethismus, which quickly shews itself. The hemorrhage, says M. Larrey, an accident much more to be apprehended, than has been supposed, often comes on a few moments after the injury, and, if prompt succour were not afforded, would put a period to the patient's existence. "I can even declare, that, had it not been for the activity of the train of flying surgical carts (*ambulances volantes*) by means of which the wounded have always been dressed upon the field of battle, many soldiers would have perished from this accident alone."

If the operation is not speedily done, pain commences, fever occurs, and the functions become disordered; the irritation then increases, and convulsive motions take place. If the patient should not be a victim to these first symptoms, (continues Larrey) the solids, after having been distended in an inordinate degree, fall into a complete atony, and hence, gangrene of the stump is occasioned, the fatal consequences of which it is extremely difficult to prevent.

After this short exposition, it is easy to see, that, in this case, amputation ought to be practised immediately, and to delay the operation, and merely apply simple dressings, would be affording time for the preceding accidents to arise.

At Strasburgh, during the bombardment of the Fort of Kell, in 1792, three volunteers, says M Larrey, had limbs shot off by the explosion of shells; one, an arm; another, a fore-arm; and the third a leg. They were conveyed to the hospital for the wounded in this town, which was superintended by M. Boy, surgeon of the first class. Several days were suffered to elapse before amputation was performed: not one of the patients escaped.

At Mayence, after the retreat from Frankfort, M. Larrey acquaints us, that several of the wounded, who had had limbs shot off, did not have amputation done till some time afterwards, and not one of them recovered.

At Nice, after the taking of Saourgio, two amputations were practised at the hospital. No. 2; one of the fore-arm, the other of the arm, nine or ten days after the receipt of the injuries: both the patients died.

At Perpignan, in the hospital Brutus, M. Larrey visited two soldiers, on whom amputation had been done, seven or eight days after the receipt of gun-shot injuries in the action of the 14th of July, 1794. One had had a leg shot off, and the other, his right arm. Notwithstanding M. Larrey's utmost care, he could not save their lives: one died of tetanus, the other of gangrene.

In the month of August, 1805, two cannoniers of the guards, in discharging the artillery, had each a hand shot away, and all the forepart of their bodies burnt. These were the two men, whose office it was to charge the gun. At the moment, when they had just rammed down the wadding on the cartridge, a spark, that had been left unextinguished, from the neglect to keep the touch-hole closed, set fire to the powder: the ramrod was violently repelled by the explosion, together with every thing that was situated in front of the charge. The right hand of one of the cannoniers was completely torn off, between the two phalanges of the carpus, and thrown more than two hundred paces. The counter shock even threw the man down into the ditch of the square of the Hôtel of Invalides. The left hand of the other cannonier was torn away, together with the fore-arm at the elbow joint, and also forced to a considerable distance. The tendons and muscles sustained vast injury from the violent manner in which the limbs were torn away, and the worst symptoms would have occurred, if amputation had not been instantly performed. But, as M. Larrey happened to be at the hospital, when these two soldiers were brought thither, he operated upon them immediately. In one, amputation was done at the wrist; and, in the other, at the lower third of the arm. The two operations were followed by complete success, although the burns upon the face and chest, in both the patients, were serious and extensive.

Second case. When a body, propelled by gunpowder, strikes a limb, in such a manner, as to smash the bones, violently contuse, lacerate, and deeply tear away, the soft parts, amputation ought to be immediately performed. If this measure be neglected, all the injured parts will soon be seized with gangrene: and besides, as M. Larrey has explained, the accidents, which the gravity of the first case produces, will also here be excited.

Third case. If a similar body were to carry away a great mass of the soft parts,

and the principal vessels of a limb, (of the thigh, for instance), without fracturing the bone, the patient would be in a state demanding immediate amputation; for, independently of the accidents, which would originate from a considerable loss of substance, the limb must inevitably mortify.

Fourth case. A large biscayen strikes the thick part of a member, breaks the bone, divides and tears the muscles and destroys the large nerves, without, however, touching the main artery. According to M. Larrey, this is a fourth case, requiring immediate amputation; a proceeding, rendered indispensable by the laceration, that has taken place in the limb, and by the commotion that has been produced through it.

Fifth case. If a spent cannon-shot, or one that has been reflected, should strike a member obliquely, without producing a solution of continuity in the skin, as often happens, the parts, which resist its action, such as the bones, muscles, tendons, aponeuroses, and vessels, may be ruptured and lacerated. The extent of the internal disorder is to be examined; and if the bones should feel, through the soft parts, as if they were smashed, and if there should be reason to suspect, from the swelling, and a sort of fluctuation, that the vessels are lacerated, amputation ought to be immediately practised. We learn from M. Larrey, that this is also the advice of M. Percy, an eminent French army surgeon. Sometimes, however, the vessels and bones have escaped injury, and the muscles are almost the only parts disordered. In this circumstance, we are enjoined to follow the counsel of M. La Martinière, who recommended making an incision through the skin. By this means, a quantity of thick blackish blood will be discharged, and the practitioner must await events. According to M. Larrey, such incision is equally necessary in the preceding case, before amputation, in order to ascertain the extent of the mischief, which the parts have sustained.

It is to such injury, done to internal organs, that we must ascribe the death of many individuals, which was for a long while attributed to the commotion produced by the air put in motion by the ball, when this, in grazing upon different parts of the body, alters them, or cuts off the column of air, which is to serve for respiration, just at the moment when it is about to enter the chest. (See *Ravaton's Traité des Plaies d'Armes à Feu.*)

Although, observes M. Larrey, this opinion has been sanctioned by surgeons of high repute, we may easily convince ourselves of its falsity, if we carefully consider, 1st, the direction and course of solid hard bodies, and their relation to the air, through which they have to pass; 2dly, the internal disorder, observable in the dead bodies of persons, whose death is imputed to the mere impression of the air, agitated by the ball; 3dly, the properties of the elastic substances, such as the integuments, cellular substance, &c. struck by the shot.

It is universally agreed amongst philosophers, that a solid body, moving in a fluid, only acts upon a column of this fluid, the base of which column is nearly equal to the surface, which the solid body presents. (See *Le Vacher sur quelques particularités concernant les playes faites par armes à feu, in Mém. de l'Acad. de Chirurgie, Tom.* II, *p.* 34, *Edit. in* 12*mo.*)

Thus a cannon-ball, in traversing a space equal to its diameter, can only displace a portion of air, in the relation of 3 to 2, compared with the size of the shot. This fluid, in consequence of its divisibility and homogenealness with the ambient air, is dispersed in all directions, and confounded with the total mass of the atmosphere. The effects of this aeriform substance amount to nothing, and not a doubt can be entertained, that if there is the slightest solution of continuity of any part of the body, it must depend upon the direct action of the ball itself.

If, besides, the quickness of the motion of a ball be considered, which quickness is known to diminish in an inverse ratio to the squares of the distance, it will be seen, that the space, through which the shot has passed, before striking the object, against which it was directed, will already have materially lessened the celerity of the projectile, while the motion of the column of air must be totally lost.

They who espouse the opinion, against which M. Larrey has written, found their argument upon a particular experiment, of which the following is a succinct account. With an air-gun, a ball is projected into a mass of argillaceous soft earth, placed upon a deal board, at two-thirds of the course of the projectile. Instead of a hole of a calibre equal to the ball, a crater is produced in this soft earth, twice, or thrice as wide as the shot, and of an oval shape. These appearances are imputed to the effect of the air forcibly impelled before the ball, the particles of the clay being thrown in all directions, and leaving an excavation accordingly.

But, says M. Larrey, is it not more probable, that this phenomenon is rather owing to the obliquity, which the ball meets with in the two lines, through which it passes, in order to enter, and make its exit from this soft inelastic sub-

stance? For, in the first case, the ball has begun its parabola, and, afterwards, the new movement, which the board in consequence of its resistance and elasticity, communicates to the ball, changes the direction of this body, and makes it take a different course. It is to these two angles, more or less open, of incidence and reflection, that according to M. Larrey, the dispersion of the particles of the argillaceous earth is owing, the effect being increased by the instantaneous projection which the point of the wood, struck by the ball, makes against the clay, by reason of its elasticity, while the particles of this earth itself the more readily sink down again, as they are destitute of any elastic property.

The different movements which the ball describes in its course, and the elasticity of the skin, will now enable us to explain, how internal injuries are produced, without any external solution of continuity, and often even without ecchymosis. The motion communicated to the ball by the power, which projects it, is, for a given space, rectilinear. If, at this instance, it strikes against the body, it carries the part away to an extent proportioned to the mass, with which it touches the part. But, the ball, after having traversed a certain distance, undergoes, in consequence of the resistance of the air and the attraction of gravity, a change of motion, and now turns on its own axis, in the diagonal direction.

If the shot should strike any rounded part of the body, towards the end of its course, it will run round a great portion of the circumference of the part, by the effect of its curvilinear movement. It is also in this manner, observes M. Larrey, that the wheel of a carriage acts, in passing obliquely over the thigh, or leg, of an individual stretched upon the ground. In this case, the results are the same as those, of which we have been speaking. The most elastic parts yield to the impulse of the contusing body; while such as offer resistance, as, for instance, the bones, tendons, muscles and aponeuroses, are fractured, ruptured, and lacerated. For the same reason, it sometimes happens, that the viscera are similarly injured.

At first sight, all the parts appear to be entire; but, a careful examination will not let us remain long in doubt about the internal mischief. In this case, an ecchymosis cannot manifest itself outwardly, because the vessels of the skin, which communicate with the internal parts, are ruptured, because the extravasation of blood naturally takes place in the deep excavations, occasioned by the rupture of the muscles and other parts, and because this fluid cannot make its way through the texture of the skin. Such extravasations can only be detected by the touch.

The foregoing reasoning is supported by experience. How often, says M. Larrey, have we not seen the ball carry away pieces of helmets, hats, cartridge-boxes, knapsacks, or other parts of the soldier's dress, without doing any other injury? The same ball, perhaps, takes off his arm, often at a time, when it is closely applied to the body of his comrade, and, yet, the latter does not receive the slightest harm. The shot may pass betwixt the thighs, and these members hardly exhibit an ecchymosis at the points, which are gently grazed; the only example, adds M. Larrey, in which, ecchymosis does occur. In other instances, the ball severs the arm from the trunk, and the functions of the thoracic viscera are not at all injured.

M. Larrey then relates the following case. M. Méget, a captain, marching in the front of a square of men, in the heat of the battle of Altzey, 30th March 1793, had his right leg almost entirely carried away by a large cannon-shot, without the contiguous limb of his lieutenant, who was as close as possible to him, receiving the least injury. The violent general commotion excited, and the extreme severity of the weather, made this officer's condition imminently perilous. The progress of the symptoms, however, was checked by amputation, which was instantly performed. M. Méget was then capable of being conveyed to the hospital at Landau, fifteen leagues from the field of battle, where he got quite well.

M. Larrey declines relating numerous other analogous amputations, which he has been called upon to practise under the same circumstances. M. Buffy, a captain of the artillery of the army of the Rhine, was struck by a howitzer, his left arm being injured, and his head so nearly grazed, that the corner of his hat, which was placed forwards over his face, was shot away as far as the crown. This officer, the skin of whose nose was even torn off, was not deprived of his senses, and he was actually courageous enough to continue for some minutes commanding his company. At length, he was conveyed to the *ambulance* of M. Larrey, who amputated his arm: in about a month, he was well.

When balls strike parts obliquely, they produce in a lesser degree the effects, which arise from the incomplete collision of a shot: their tortuous course in the substance of a member is subject to curious varieties.

But, to return to the object of our present consideration, M. Larrey expresses his belief, that what have been erroneously termed *wind contusions*, if they are attended with the mischief above speci-

fied, require immediate amputation. The least delay makes the patient's preservation extremely doubtful. The internal injury of the member may be ascertained by the touch, by the loss of motion, by the little sensibility retained by the parts, which have been struck; and, lastly, by practising an incision, as already recommended.

In order to confirm the principle, which he endeavours to establish, in opposition to many writers, M. Larrey indulges himself with the following digression.

At the siege of Roses, two cannoniers, having nearly similar wounds, were brought from the trenches to the ambulance, which M. Larrey had posted at the village of Palau. They had been struck by a large shot, which, towards the termination of its course, had grazed posteriorly both shoulders. In one, M. Larrey perceived a slight ecchymosis over all the back part of the trunk, without any apparent solution of continuity. Respiration hardly went on, and the man spit up a large quantity of frothy vermilion blood. The pulse was small and intermitting, and the extremities were cold. He died an hour after the accident, as M. Larrey had prognosticated. This gentleman opened the body, in the presence of M. Dubois, inspector of the military hospitals of the army of the eastern Pyrenees. The skin was entire; the muscles, aponeuroses, nerves, and vessels of the shoulders were ruptured and lacerated, the scapulæ broken in pieces, the spinous processes of the corresponding dorsal vertebræ, and the posterior extremity of the adjacent ribs, fractured. The spinal marrow had suffered injury; the neighbouring part of the lungs was lacerated, and a considerable extravasation had taken place in each cavity of the chest.

The second cannonier died of similar symptoms, three quarters of an hour after his arrival at the hospital. On opening the body, the same sort of mischief was discovered, as in the preceding example.

In the German campaigns of the French armies, M. Larrey has met with several similar cases, and accurate examination has invariably convinced him of the direct action of a spherical body, propelled by means of gunpowder.

Sixth case. When the articular heads are much broken, especially those which form the joints of the foot, or knee, and the ligaments, which strengthen these articulations, are broken and lacerated, by the fire of a howitzer or by a biscayen, or other kind of ball, immediate amputation, says M. Larrey, is indispensable. According to this experienced writer, the same indication would occur, were the ball lodged in the thickness of the articular head of a bone, or were it so engaged in the joint, as not to admit of being extracted by simple and ordinary means.

It is only in this manner, that the patients can be rescued from the dreadful pain, the spasmodic affections, the violent convulsions, the acute fever, the considerable tension, and the general inflammation of the limb, which, M. Larrey observes, are the invariable consequences of bad fractures of the large joints. But, adds this author, if the voice of experience be not listened to, and amputation be deferred, the parts become disorganized, and the patient's life is put into imminent peril.

It is evident, says he, that, in this case, if we wish to prevent the patient from dying of the consequent accidents, amputation should be performed before twelve, or at most twenty-four hours, have elapsed: even M. Faure himself professed this opinion, in regard to certain descriptions of injury.

Seventh case. According to M. Larrey, if a large biscayen, a small cannon-shot, or a piece of a bomb-shell, in passing through the substance of a member, should have extensively denuded the bone, without breaking it, amputation is equally indicated, although the soft parts may not appear to have particularly suffered. Indeed, the violent concussion produced by the accident, has shaken and disorganized all the parts; the medullary substance is injured, the vessels are lacerated, the nerves immoderately stretched, and thrown into a state of stupor; the muscles are deprived of their tone; and the circulation and sensibility in the limb are obstructed. Before deciding, however, M. Larrey cautions us to observe attentively the symptoms, which characterize this kind of disorder. This case can be supposed to happen only in the leg, where the bone is very superficial, and merely covered at its anterior part with the skin.

The following are described as the symptoms: the limb is insensible, the foot cold as ice, the bone partly exposed, and on careful examination, it will be found that the integuments, and even the periosteum, are extensively detached from it. The commotion extends to a considerable distance; the functions of the body are disordered; and all the secretions experience a more or less palpable disturbance. The intellectual faculties are suspended, and the circulation is retarded. The pulse is small and concentrated; the countenance pale; and the eyes have a dull moist appearance. The patient feels such anxiety, that he cannot long remain in one posture, and requests, that

his leg may be quickly taken off, as it incommodes him severely, and he experiences very acute pain in the knee. When all these characteristic symptoms are conjoined, says M. Larrey, we should not hesitate to amputate immediately; for, the leg would be attacked with sphacelus the same day, and the patient would certainly perish.

M. Larrey next adduces several interesting cases in support of the preceding observations.

Eighth case. When a large gynglimoid articulation, such as the elbow, or especially the knee, has been extensively opened with a cutting instrument, and blood is extravasated in the joint, M. Larrey deems immediate amputation necessary. In these cases, the synovial membranes, the ligaments and aponeuroses, inflame; the part swells, and erethismus rapidly takes place and acute pains, abscesses, deep sinuses, caries, febrile symptoms and death, are the speedy consequences. M. Larrey has seen numerous subjects die of such injuries, on account of the operation having been postponed with a hope of saving the limb. In his Mémoires de Chirurgie Militaire, Tom. 2, some of these are detailed.

Although a wound may penetrate a joint, yet, if it be small and unattended with extravasation of blood, M. Larrey informs us, it will generally heal, provided too much compression be not employed. This gentleman believes in the common doctrine of the pernicious effect of the air on the cavities of the body; yet, in this place, a doubt seems to affect him: speaking of the less danger of small wounds of joints, he says; "*a quoi tient cette différence, puisque l'air pénètre dans l'articulation dans l'un comme dans l'autre cas?*"

When two limbs have been at the same time so injured, as to require amputation, we should not be afraid of amputating them both immediately, without any interval. We have, says M. Larrey, several times performed this double amputation, with almost as much success, as the amputation of a single member. He has recorded an excellent case in confirmation of this statement. (*Mém. de Chirurgie Militaire, Tom.* 2, *p.* 478.)

When a limb is differently injured at the same time in two places, and one of the wounds requires amputation, (suppose a wound of the leg with a splintered fracture of the bone, and a second of the thigh, done with a ball, but, without any fracture of the os femoris, or other bad accident) M. Larrey recommends us, first to dress the simple wound of the thigh, and amputate the leg immediately afterwards, if the knee be free from injury. When it is necessary to amputate above this joint, the less important wound need not be dressed, till after the operation, provided it can be comprehended in the section of the member, or be so near the place of the incision as to alter the indication. When the wound, demanding amputation, is the upper one, the operation of course is to be done above it, without paying any regard to the injury situated lower down.

M. Larrey, however, approves of deferring the operation, when delirium, convulsions, and inflammation prevail on the first receipt of the injury. In this circumstance, we are advised to take measures for appeasing these accidents; the progress of nature is to be carefully observed; and the first moment of quiet is to be taken advantage of, for the performance of the operation. (See *Larrey's Mém. de Chirurgie Militaire, Tom.* 2. *p.*451, *&c.*)

OF GUN-SHOT WOUNDS, IN WHICH AMPUTATION MAY BE DEFERRED.

If, says M. Larrey, it be possible to specify the cases, in which amputation ought to be immediately performed, it is impossible to determine *à priori* those, which will require the operation subsequently. One gun-shot wound, for example, will be cured by ordinary treatment, while, another, that is at first less severe, will afterwards render amputation indispensable, whether this be owing to the patient's bad constitution, or the febrile complaints, which are induced. However this may be, the safe rule for fulfilling the indication, that presents itself, is to amputate consecutively only in circumstances, in which, every endeavour to save the limb is manifestly in vain. Upon this point M. Larrey's doctrine differs from that of Faure.

The latter practitioner admits cases, which he terms cases *of the second kind*, in which he delays amputation, not with any hope of saving the limb, but, in order to let the first symptoms subside. The operation, done between the fifteenth and twentieth day, appears to him less dangerous, than when performed immediately after the receipt of the injury. At the above period, according to M. Faure, the commotion, occasioned by the gun-shot injury is dispelled; the patient can reconcile himself to amputation, the mere mention of which fills the pusillanimous with terror in a greater or lesser degree; the debility of the individual is no objection; and it is laid down as an axiom "that the consequences of every amputation, done in the first instance, are in general extremely dangerous." In support of his theory, M. Faure adduces ten cases of gun-shot injuries, in which

after the battle of Fontenoy, the operation was delayed, in order that it might afterwards be performed with more success: a plan, which, according to the author, proved completely successful. (See *Prix de l'Acad. de Chirurgie, Tom.* 8, *Edit. in* 12*mo.*)

This division of the cases for amputation into two classes, not consistent with nature, observes M. Larrey, has been the cause of a great deal of harm. Very often the partisans of M. Faure have not dared to resort in the first instance to amputation, the dangers of which they exaggerate; while, on other occasions, they amputate, consecutively, without any success.

The effects of commotion, instead of increasing, says M. Larrey, gradually diminish and disappear after the operation. The proximate cause of all the ill effects of such commotion, is ascribed by this experienced author to the violent percussion of the foreign body, which percussion is propagated extensively to every part that is susceptible of it. According to the same writer, it is also owing to the laceration, or incomplete section of the injured nerves, and the inflammatory turgescence of the vessels. The speedy amputation of the limb must then produce a favourable change in the whole animal economy. In fact, the tense nerves, on being divided, says he, are set at liberty, and the fluids circulate with greater facility; the irritation, which always accompanies terrible injuries, is appeased; and the loaded vessels get rid of their redundant blood, and contract. Constriction, inflammation, and erethismus, which always complicate great lacerated wounds, according to M. Larrey, are thus prevented. It is then proved, says he, that the commotion, so far from being a counter-indication to immediate amputation, is a reason that should incline the surgeon to operate. Such was the sentiment of La Martinière and Boucher.

M. Larrey next cites some cases in support of the foregoing observations; but, these I shall here omit, in order that the present article may not be immoderately enlarged.

Neither ought the patient's alarm to be a reason for postponing the operation; for, according to M. Larrey, the patient, just after the accident, will be much less afraid of the risk, which he has to encounter, than after the expiration of the first four and twenty hours, when he has had time to reflect upon the consequences of the injury, or of amputation. This remark has been made by the illustrious Paré.

"Experience, agreeing with my theory, (says M. Larrey) has proved both to the army and navy surgeons, that the bad symptoms which soon follow such gun-shot injuries, as must occasion the loss of a limb, are much more to be dreaded, than those of immediate amputation. Out of a vast number of the wounded, who suffered amputation in the course of the first four and twenty hours after the memorable naval battle of the first of June, 1794, a very few lost their lives. This fact has been attested by several of our collegues, and, especially, by M. Fercoc, surgeon of the ship *le Jemmappe*."

The following is said to be an extract from one of his letters.

"After the naval engagement on the first of June, 1794, a great number of amputations were done immediately after the receipt of the injuries. Sixty of the patients, whose limbs had been thus cut off, were taken to the naval hospital, at Brest, and put under the care of M. Duret. With the exception of two, who died of tetanus, all the rest were cured; and there was one, who had had both his arms amputated. The surgeon of the *Téméraire*, which ship was captured by the English, was desirous in compliance with the advice of their medical men, to defer the operation, which many of the wounded stood in need of, till his arrival in port; but, he had the mortification to see them all die during the passage, &c."

M. Larrey next acquaints us, that, when he was sent to the army of Italy, in 1796, he had also the pain of seeing, in the hospitals, great numbers of the wounded fall victims to the confidence, which many of the surgeons of that army placed in the principles of M. Faure. General Bonaparte saw, that the *ambulance volante* was the only thing, that, in the event of fresh hostilities, could prevent such accidents; and, in consequence of his orders, M. Larrey formed the three divisions d'ambulance which are described in his Mémoires de Chirurgie Militaire.

Since this period it has always been customary in the French armies, on the day of battle, to make every preparation for performing amputations as speedily as possible. The mere sight of these *ambulances*, (always attached to the advanced guard,) says M. Larrey, encourages the soldiers, and inspires them with the greatest courage. On this occasion, the following anecdote is cited from Ambrose Paré.

This famous surgeon having been urgently sent for by the duke de Guise, besieged in Metz, to attend the wounded of his army, who were in want of assistance, Ambroise Paré was shewn to the frightened soldiers, at the breach. Upon this, they immediately filled the air with shouts of the most lively joy, and cried out: "*Nous ne pouvons plus mourir, s'il arrive*

que nous soyons blessés, puisque Paré est parmi nous." Their courage revived, and their confidence in this skilful surgeon, contributed to the preservation of a place, before which a formidable army was destroyed.

M. Larrey desires us to interrogate the invalids, who have lost one, or two of their limbs, and nearly all will tell us, that they suffered amputation a few minutes after the accident, or in the first four and twenty hours.

"If Faure now retains any partisans," says M. Larrey, "I recommend them to repair to the field of battle, the day after an action; they would then soon be convinced, that, without the prompt performance of amputation, a great number of soldiers must inevitably lose their lives. In Egypt, this truth was particularly manifested."

The following communication upon this point was made to M. Larrey by M. Masclet, a French surgeon on duty at Alexandria.

"In the naval hospital of this port, I have seen eleven soldiers, or sailors, who were wounded in the naval action off Aboukir, and who had suffered amputation in the first four and twenty hours. In five of these cases, the operation had been done on the arm; in two, on the thigh; and, in three others, on the leg. All these men are recovering. In the army hospital, there have been only three thigh-amputations, which were performed seven or eight days after the battle, and these three patients died a few days after the operation, although the operation was done methodically, and no grave symptoms prevailed at the time of its performance. You see, sir, experience has, in this instance, quite confirmed your principles."

In 1780, during the American war, we are informed by M. Larrey, that the surgeons of the French army performed a great number of amputations, according to the opinion then generally adopted in France, that the operation should not be undertaken till after the subsidence of the first symptoms. Almost all the patients, thus treated, died after the operation. On the contrary, the Americans, who had the boldness to amputate immediately (or in the first twenty-four hours) upon many of their wounded countrymen, lost only a very few. Yet, M. Dubor, at that time surgeon to the Artois dragoons, and from whom M. Larrey has collected this fact, relates, that the situation of the hospital for the French wounded was, on many accounts, the most advantageous. (See *Dubor's These Inaugurale, soutenue 16 Septembre, 1803, à l'Ecole de Strasbourgh.*)

Admitting, says M. Larrey, that, by a concurrence of fortunate circumstances, which are not always to be calculated upon, some patients escape the danger of the first symptoms, this proves nothing in favour of doing the operation afterwards: it must be seen what nature will do towards the event of the case.

If, at the end of twenty, or thirty days, the prognostic is as bad as it was previously, amputation cannot be avoided. Thus all the sufferings, which the patient has endured, have been undergone for nothing, and the operation will now be attended with considerable risk, inasmuch as the patient may lie in a dangerously weakened state.

If nature revives at all, no doubt, the success of the operation becomes more probable; but, in this case, the surgeon, instead of having recourse to amputation, should redouble his efforts to preserve the limb.

CASES DEMANDING AMPUTATION CONSECUTIVELY.

M. Larrey gives us the annexed information upon this subject.

First Case. A spreading Mortification. If the disorder be owing to an internal and general cause, it would then be rashness in the surgeon to amputate before nature had put limits to the disease. This kind of gangrene, according to M. Larrey, is distinguished from that, which is named *traumatic*, by the symptoms, which precede and accompany it. These symptoms are similar to those, which are observed in nervous ataxia, or adynamia. Here the operation ought to be deferred, and endeavours made to combat the general causes with regimen and internal medicines.

But, when the gangrene is *traumatic*, the limb, says M. Larrey, should be immediately cut off above the disorganised part. Several facts, in support of this advice, are related by this experienced surgeon in his *Mémoire sur la Gangrene Traumatique.*

How contrary this advice to that inculcated by Sharp, Pott, and all the most eminent surgeons of the present time!

Second case. Convulsions of the wounded Limb. Amputation of the member, performed immediately the first symptoms of tetanus manifest themselves, interrupts all communication between the source of the disorder, and the rest of the body. The operation, according to M. Larrey, unloads the vessels, and thus puts a stop to the tension of the nerves, and to the convulsions of the muscles. These first effects, he says, are followed by a general collapsus, which promotes the excretions, sleep, and the equilibrium of every part of the system.

The whole of the momentary pain, caused by the operation, cannot increase the existing irritation: besides the sufferings of tetanus render those of amputation, more bearable, and lessen their intensity, especially, when the principal nerves of the limb are strongly compressed.

Third Case. Bad State of the Discharge. It often happens, that, in gunshot wounds, complicated with fractures, notwithstanding the most skilful treatment, the discharge becomes of a bad quality; the fragments of bone lie surrounded with the matter, and have not the least tendency to unite; the patient is attacked with hectic fever, and a colliquative diarrhœa. Under these circumstances, life may sometimes be preserved by amputation.

Fourth Case. Bad State of the Stump. In hospitals, says M. Larrey, the cure of amputations is sometimes prevented by a fever of a bad character. The stump swells, the integuments become at first retracted, and then reverted and diseased a good way upward. The wound changes into a fungous ulcer, the cicatrization of which is hindered by the deep disorder of the bone, and the ulceration of the soft parts. The extremity of the bone projects. In order to remedy this last evil, it has been proposed to saw off the projecting part of the bone, and, with this, even to amputate all the flesh beyond the level of the skin. M. Larrey condemns such practice, as unnecessary and dangerous, and he recommends giving nature time to effect the exfoliation of the diseased projecting part of the bone, and heal the wound. The foregoing observations, relative to amputation in cases of gun-shot wounds, are taken from the latter part of the second volume of Larrey's Mémoires de Chirurgie Militaire.

GUNSHOT WOUNDS OF THE ABDOMEN.

These cases may be divided into two kinds; one only penetrates the parietes of the belly, without hurting the contained parts; the other does mischief also to the viscera. The event of these two kinds of wounds is very different. In the first, little danger is to be expected, if properly treated; but, in the second, the success will be extremely uncertain, for, in many instances, nothing can be done for the patient, and, on other occasions, a good deal of art may be employed with advantage.

It is observed by Mr. Hunter, that such wounds of the abdomen, as do not injure parts like the stomach, intestines, bladder, ureters, gall-bladder, large blood-vessels, &c. all which contain particular fluids, will generally end well. But, he adds, that there will be a great difference, when the ball has passed with immense velocity, as a slough will be produced; whereas, when the ball has moved with less impetus, there will not be so much sloughing, and the parts will, in some degree, heal by the first intention. Even when the ball occasions a slough, the wound frequently terminates well, the adhesive inflammation taking place on the peritoneum, all round the wound, so as to exclude the general cavity of the abdomen from taking part in the inflammation. Such is often the favourable event, when the ball, besides entering the abdomen, has wounded parts like the omentum, mesentery, &c. and gone quite through the body. (*Hunter on Inflammation; Gunshot Wounds, &c. p.* 543.)

In gunshot wounds of the belly, an extravasation is apt to take place on the sloughs becoming loose, about eight, ten, twelve, or fourteen days, after the accident; but, says Mr. Hunter, although this new symptom is in general very disagreeable, most of the danger is usually over, before it can appear.

In the article, *Abdomen*, we have detailed at large the general principles, which should be observed in the treatment of wounds of the belly, and, in order to avoid superfluous repetitions, suffice it in the present place to refer to that part of the dictionary.

For the purpose of illustrating the mode of treating gunshot wounds of the abdomen, complicated with injury of the intestines and bladder, I shall lay before the reader the annexed observations from M. Larrey.

At the assault of Cairo, 1799, M. N. was shot in the abdomen with a ball, which divided the muscular parietes of this cavity on the right side, and a portion of the ilium. M. Larrey being upon the field of battle, gave him the first assistance. The two ends of the intestine were protruded, separated from each other, and inflated. The upper end was everted, in such a way, that its contracted edge, like the prepuce in a case of paraphymosis, strangulated the intestinal tube. The course of the fecal matter was thus obstructed, and the contents of the bowel accumulated above the constriction.

Although the patient's recovery was nearly hopeless, both from the nature of the wound, and from the debility and cholera morbus, which had already seized him in the short period, that he remained without succour in one of the intrenchments, M. Larrey was desirous of trying what could be done for so singular a case.

This eminent military surgeon first made four small cuts, through the con-

stricted part of the intestine, with a pair of curved scissars, and put the bowel into its ordinary state. He passed a ligature through the piece of the mesentery, corresponding to the two extremities of the bowel. These he reduced as far as the margin of the opening, which he had taken care to dilate, and the dressings having been applied, he awaited events. The first days were attended with alarming symptoms, which, however, afterwards subsided. Those, which depended upon the loss of the alimentary matter, successively abated; and, after two months, the ends of the ilium were opposite each other, and disposed to become connected together. M. Larrey seconded the efforts of nature, and dressed the patient with a tampon, or sort of tent, that was occasionally employed for two months. The patient was then discharged from the hospital quite cured.

In several instances, say M. Larrey, the sigmoid flexure of the colon, was injured, and yet the wounds were cured without any fecal fistulæ. At the siege of Acre, three examples occurred; and, at that of Cairo, two. M. Larrey took care to dilate well the entrance and exit of the ball. Clysters, made of a decoction of linseed, and emollient beverages were frequently exhibited; and the patients were kept on low diet, and in the most quiet state.

M. Larrey informs us, that the gunshot wounds of the bladder, which occurred in Egypt, had for the most part a favourable termination. The most remarkable case was that of Francis Chaumette, a light horseman, who was wounded at the battle of Tabor. The ball passed across the hypogastrium, about one finger-breadth above the pubes, to the point of the left buttock, which corresponds to the ischiatic notch. The direction of the wound, and the issue of feces and urine from the two orifices, could not let M. Larrey doubt, that the bladder and rectum were injured. M. Milioz, who directed the surgical affairs of the division of the army under Kleber, diligently pursued the same kind of treatment which he had seen M. Larrey adopt at the siege of Acre. During the suppurative stage, the patient was affected with fever; and, after the sloughs were detached, the discharge was very copious. A catheter, that was passed into the bladder, prevented an extravasation of the urine, and, at the same time, promoted the union of the wound of that viscus. This was healed the first, and the patient upon his return to Cairo, was quite cured.

M. Larrey has recorded several other interesting cases of wounds of the bladder, to which I must content myself with referring. (See *Mémoires de Chirurgie Militaire, Tom.* 2, *p.* 160—165. *Tom.* 3, *p.* 340, *&c.*

This experienced military surgeon offers the following as a succinct account of the results of such injuries, and the treatment, which is proper.

During the first four and twenty hours very little urine escapes from gun-shot wounds of the bladder, in consequence of the swelling, which almost instantly affects the lips of the wound. When the bladder is full, this fluid is only discharged at the moment of the accident, and only from the wound, by which the ball has made its exit. An extravasation is prevented by the thick slough, which fills all the track of the injury, and it is not till the deadened parts become loose, that any effusion can happen. Hence, it is of the highest importance to have an elastic gum catheter introduced into the urethra, where it should be kept, and the instrument should be large enough to fill exactly this canal; for, if at the period, when the sloughs are detached, the urine has not a ready passage outward, it passes through the wound, and is extravasated the more readily, inasmuch as the separation of the sloughs has occasioned many openings, by which the fluid may insinuate itself into the cellular membrane. Hence, gangrenous mischief and death.

After having well dilated the wounds, in order to facilitate the escape of the urine, which might lodge in the track of the ball, a large elastic gum catheter should be introduced, and left in the bladder, taking care to withdraw it, and pass in a clean one every two or three days, so that no incrustations may occur. Emollient clysters, and acidulated demulcent drinks are to be prescribed, and the patient is to kept upon a very low regimen, and in the most quiet state. The dressings are to be simple, and cleanliness observed. (*Op. cit. T.* 2, *p.* 165—160.)

GUN-SHOT WOUNDS OF THE THORAX.

Wounds of the lungs, abstracted from other mischief, are now well known not to be always fatal. Mr. Hunter had some reason to believe, that wounds of the lungs, made with balls, were generally less dangerous, than such as were made with sharp-pointed instruments; for, he had seen several patients recover, after they had been shot through the lungs, while other persons died of very small wounds of those organs, done with swords and bayonets. Perhaps, one cause of this fact may be owing to the circumstance of gun-shot wounds bleeding less, than other wounds, so that there is not so much danger of blood being ef-

fused in the cavity of the chest, or the cells of the lungs. The indisposition of the orifice of a gun-shot wound to heal up too soon, is also another circumstance, that must lessen the hazard, as whatever matter happens to be extravasated has thereby an opportunity of escaping.

But, from what has been stated, it must not be inferred, that gun-shot wounds of the lungs are not accompanied with a serious degree of danger. Frequently, the patient expires instantly, being suffocated in consequence of the hemorrhage from those organs; for, though it be true, that gun-shot wounds generally do not bleed much, when the injured vessels are under a certain size, yet, the contrary is the case, when the wounded vessels are like those, which exist towards the root of the lungs. Gun-shot wounds of the chest also often prove fatal by the inflammation, that is excited within this cavity.

It cannot be supposed, that adhesions take place round the opening of a gun-shot wound in the chest, because the lungs collapse, and become considerably distant from the pleura, whenever a free communication is established between the atmospheric air and the cavity of the thorax. However, as adhesions are extremely common between the outer surface of the lungs, and the inner surface of the pleura costalis, they must, in many instances, exist before the receipt of a wound, and, of course, prevent the usual collapse of the lungs.

The general symptoms, and also the treatment of wounds of the chest, are detailed in the article, *Thorax*. Suffice it in the present place to observe, that, when a patient has been shot in the chest, the most important indication is to prevent and subdue inflammation of the lungs and pleura. In few other cases, can repeated and large bleedings be so advantageously practised. The patient is also to be kept on the lowest diet, take febrifuge medicines, and, if he be much disturbed with a cough, the spermaceti mixture with opium. Here, there will not be so much danger of an extravasation of blood, as in stabs, and, even if an effusion of that fluid were to happen within the cavity of the pleura, the opening would generally be sufficient for its escape, and it would not be so frequently found necessary to dilate the wound, or make a new opening, as when the injury has been inflicted with a sharp-pointed weapon.

When matter forms in the thorax in consequence of gun-shot wounds, the opening will generally suffice for its escape; but, should the collection of pus be confined and occasion dangerous symptoms, the external wound must either be enlarged, or a new incision be practised, according as circumstances may indicate. The mode of making an opening into the chest is considered in the article, *Paracentesis*.

For information on gun-shot wounds, consult the *works of Ambrose Paré; Ranby on the Cure of Gun-shot Wounds*, 8vo. *London*, 1744. *Observations sur des Plaies d'armes à feu, compliquées de fracture, aux articulations des extremités, ou au voisinage de ces articulations, par M. Boucher: in Mém. de l'Acad. de Chirurgie, Tom. 5, p. 279, Edit. in* 12mo. *Observations sur des Plaies d'armes à feu compliquées surtout de fracas des os, par M. Boucher, in opere cit. Tom. 6, p. 109, &c. Edit. in* 12mo. *Observations sur les Plaies d'armes à feu: 1. Sur un coup de fusil, avec fracas des deux machoires; par M. Cannac. 2. Sur une Plaie d'arme à feu traversant la Poitrine d'un côté à l'autre; par M. Gerard. 3. Sur une Plaie d'arme à feu, pénétrante depuis la partie anterieure du pubis, jusqu' à l'os sacrum; par M. Andouillé. 4. Sur une Jambe écrasée par un Obus, ou petite bombe, par M. Cannac. 5. Sur une Plaie à la partie inférieure et interne de la Jambe faite par un éclat de Grenade, sans fracas d'os; par M. Cannac. 6. Précis de plusieurs Observations sur les Plaies d'armes à feu en différentes parties par M. Bordenave. All these papers are inserted in Mém. de l'Acad. de Chirurgie, Tom. 6, in* 12mo., *and in Tom. 11 of the same edition, are inserted Mémoire sur le traitment des Plaies d'armes, à feu, par M. de la Mártiniére, and Mémoire sur quelques particularités concernant les Plaies faites par armes à feu, par M. Vacher. M. Faure's memoir relative to amputation in cases of gun-shot wounds may be seen in Tom. 8, of the Recueil des Pieces qui ont concouru pour le Prix de l'Acad. de Chirurgie, Edit. in* 12mo. *John Hunter's Treatise on the Blood, Inflammation, and Gun-shot Wounds. Richter's Anfangsgrunde der Wundarzneykunst, Band* 1. *Schmucker's Chirurgische Wahrnehmungen. Richerand's Nosographie Chirurgicale, Tom.* 1, *p.* 217, *&c. Edit.* 2. *Chevalier's Treatise on Gun-shot Wounds, Edit.* 3. *Levéillé's Nouvelle Doctrine Chirurgicale, Tom.* 1, *Chap.* 8, *p.* 436, *&c. Encyclopédie Méthodique, Partie Chirurgicale, art. Plaies d'armes à feu. Larrey's Mémoires de Chirurgie Militaire.*

GUTTA SERENA. A term, said to have been first applied by Actuarius to amaurosis, or the species of blindness arising from an insensible state of the retina, or optic nerve. (See *Amaurosis.*)

Under this latter head, I have treated of the subject so fully, that it is not my intention to expatiate upon it here. However, as there is one particular case, not noticed in the article, *amaurosis*, I must take the present opportunity of mentioning it.

According to the observations of Mr.

Ware, persons, who labour under this disorder, are not unfrequently subject to a particular kind of ophthalmy, which occasions a most excruciating pain, and seems to require a peculiar mode of treatment. At the close of the remarks published on the ophthalmy, fistula lachrymalis, &c., by Mr. Ware, this gentleman has introduced a case of this kind, which was greatly relieved by making a puncture through the tunica sclerotica into the ball of the eye with a grooved needle, somewhat larger, than a common sized couching needle, nearly in the part, where this instrument is introduced in the operation of depressing the cataract. Through the groove of the instrument, a watery fluid immediately issued, which was not unlike that which Mr. Ware has several times seen effused between the choroid coat and retina after death, in cases of gutta serena. After the pain of the operation had ceased, the patient became quite easy, and the inflammation soon subsided. Since this example, Mr. Ware has performed a similar operation in a considerable number of resembling instances, and in several of them the proceeding has been attended almost immediately with manifest good effects.

For further information on this subject, the reader must refer to *Ware on the operation of largely puncturing the capsule of the crystalline humour, &c. and on the Gutta Serena, accompanied with pain and inflammation*, 1812.

H.

HÆMATOCELE. from αιμα, blood, and κηλη, a tumour.) This is a swelling of the scrotum, or spermatic cord, proceeding from, or caused by, blood.

A distinction of the different kinds of hæmatocele, though not usually made, is absolutely necessary toward rightly understanding the disease; the general idea, or conception of which, appears to Mr. Pott to be somewhat erroneous, and to have produced a prognostic which is ill-founded, and hasty. According to this eminent surgeon, "the disease, properly called hæmatocele, is of four kinds; two of which have their seat within the tunica vaginalis testis; one within the albuginea; and the fourth in the tunica communis, or common cellular membrane, investing the spermatic vessels.

"In passing an instrument, in order to let out the water from an hydrocele of the vaginal coat, a vessel is sometimes wounded, which is of such size, as to tinge the fluid pretty deeply at the time of its running out; the orifice becoming close, when the water is all discharged, and a plaster being applied, the blood ceases to flow from thence, but insinuates itself partly into the cavity of the vaginal coat, and partly into the cells of the dartos; making, sometimes, in the space of a few hours, a tumour nearly equal in size to the original hydrocele. This is one species.

"It sometimes happens, in tapping an hydrocele, that although the fluid discharged by that operation be perfectly clear and limpid, yet, in a very short space of time, (sometimes in a few hours) the scrotum becomes as large as it was before, and palpably as full of a fluid. If a new puncture be now made, the discharge, instead of being limpid (as before) is now either pure blood, or very bloody. This is another species: but, like the preceding, confined to the tunica vaginalis.

"The whole vascular compages of the testicle is sometimes very much enlarged, and at the same time rendered so lax and loose, that the tumour produced thereby has, to the fingers of an examiner, very much the appearance of a swelling composed of a mere fluid, supposed to be somewhat thick or viscid. This is in some measure a deception; but not totally so: the greater part of the tumefaction is caused by the loosened texture of the testis; but there is very frequently a quantity of extravasated blood also.

"If this be supposed to be an hydrocele, and pierced, the discharge will be mere blood. This is a third kind of hæmatocele; and very different, in all its circumstances, from the two preceding: the fluid is shed from the vessels of the glandular part of the testicle, and contained within the tunica albuginea.

"The fourth consists in a rupture of, and an effusion of blood from, a branch of the spermatic vein, in its passage from the groin to the testicle. In which case, the extravasation is made into the tunica communis, or cellular membrane investing the spermatic vessels."

Each of these four, Mr. Pott says, he has seen so distinctly, and perfectly, that he has not the smallest doubt concerning their existence, and of their difference from each other.

"The tunica vaginalis testis, (he continues) in a natural and healthy state, is a membrane, which, although firm, is of

no great thickness; it is white, or rather of a reddish white colour; and its blood-vessels are (in a healthy state) no more apparent to the eye, than are those of the tunica albuginea: but when it has been long or much distended, it thereby becomes thick, and tough; and the vessels (especially those of its inner surface) are sometimes so large, as to be very visible, and even varicous. If one of these lies in the way of the instrument, wherewith the palliative cure is performed, it is sometimes wounded; in which case, as I have already observed, the first part of the serum which is discharged, is pretty deeply tinged with blood.

"Upon the collapsion of the membranes, and of the empty bag, this kind of hemorrhage generally ceases, and nothing more comes of it. But it sometimes happens, either from the toughness of the tunic, or from the varicous state of the vessel, that the wound (especially if made by a lancet) does not immediately unite; but continues to discharge blood into the cavity of the said tunic, thereby producing a new tumour, and a fresh necessity of operation."

This is what Mr. Pott calls the first species of hæmatocele, which evidently consists in a wound of a vessel of the vaginal tunic.

"Upon the sudden discharge of the fluid, from the bag of an over-stretched hydrocele, and thereby removing all counter-pressure against the sides of the vessels, some of which are become varicous, one of them will, sometimes, without having been wounded, burst. If the quantity of blood, shed from the vessel so burst, be small, it is soon absorbed again; and, creating no trouble, the thing is not known*. But if the quantity be considerable, it, like the preceding, occasions a new tumour, and calls for a repetition of the operation." This, Mr. Pott calls the second species: "which, like the first, belongs entirely to the vaginal coat, and has no concern either with the testicle, or with the spermatic vessels. In both, the bag which was full of water, becomes in a short space of time distended with blood; which blood, if not carried off by absorption, must be discharged by opening the containing cyst: but in neither of these can castration (though said to be the only remedy) be ever necessary: the mere division of the sacculus, and the application of dry lint to its inside, will, in general, if not always, restrain the hemorrhage, and answer every purpose, for which so severe a remedy has been prescribed. The other two are indeed of more consequence; they interest either the testicle itself, or the vessels by which it is supplied with blood, and rendered capable of executing its office; and are sometimes not curable, but by removal of the part.

"One of these is seated within the tunica albuginea of the testicle; the other in the tunica communis of its vessels: they are neither of them very frequent; but when they do happen, they call for all our attention.

"If blood be extravasated within the tunica albuginea, or proper coat of the testicle, in consequence of a great relaxation, and (as it were) dissolution of part of the vascular compages of that gland, and the quantity be considerable, it will afford or produce a fluctuation, to the hand of an examiner, very like to that of an hydrocele of the tunica vaginalis; allowing something for the different density of the different fluids, and the greater depth of the former from the surface.

"If this be mistaken for a simple hydrocele, and an opening be made, the discharge will be blood; not fluid, or very thin; not like to blood circulating through its proper vessels; but dark, and dusky in colour, and nearly of the consistence of thin chocolate (like to what is most frequently found in the imperforate vagina.) The quantity discharged will be much smaller than was expected from the size of the tumour; which size will not be considerably diminished. When this small quantity of blood has been so drawn off, the testicle will, upon examination, be found to be much larger than it ought to be; as well as much more loose and flabby; instead of that roundness and resistance arising from an healthy state of the gland, within its firm strong coat; it is soft, and capable of being compressed almost flat, and that generally without any of that pain and uneasiness, which always attend the compression of a sound testicle. If the bleeding ceases upon the withdrawing the cannula (supposing a trochar to have been used) and the puncture closes, a fresh accumulation of the same kind of fluid is soon made, and the same degree of tumefaction is produced, as before the operation: if the orifice does not close, the hemorrhage continues, and very soon becomes alarming.

"In the two preceding species, the blood comes from the tunica vaginalis, the testis itself being safe, and unconcerned; and the remedy is found, by opening the cavity of the said tunic; but in this, the hemorrhage comes from the substance of the testicle; from the convolutions of the spermatic artery, within the tunica albuginea: the division of the vaginal coat

* Hence, the last running of the water from an hydrocele, is often bloody.

can here do no good; and an incision made into the albuginea can only increase the mischief: the testicle is spoiled, or rendered useless, by that kind of alteration made in it, previous to the extravasation; and castration is the only cure, which a patient in such circumstances can depend upon.

"The last species of this disease arises from a bursting of a branch of the spermatic vein, between the groin and scrotum, in what is generally known by the name of the spermatic process. This, which is generally produced by great or sudden exertions of strength, feats of agility, &c. may happen to persons in the best health, whose blood and juices are in the best order, and whose genital parts are free from blemish, or disease.

"The effusion, or extravasation, is made into the cellular membrane, which invests and envelopes the spermatic vessels, and has something the appearance of a true hernia. When the case is clear, and the extravasated blood does not give way to discutient applications, the only remedy is to lay the tumour fairly open, through its whole length. If the vessel or breach be small, the hemorrhage may be restrained by mere compression with dry lint, or by the use of styptics; but if it be large, and these means do not succeed, the ligature must be made use of." (*Pott's Chirurgical Works, Vol. II.*)

The bleeding point should be tied singly. It can never be warrantable to tie the whole spermatic chord, and then perform castration, in a case like this, notwithstanding Mr. Pott advises this plan, in case the bleeding branch cannot be tied singly. Discutient applications, and an occasional purge, will almost always disperse the swelling; and if not, opening it, taking out the blood, filling the cavity with lint, and using compression, one may say, will always answer.

The best of the old writers on Hæmatocele, are Celsus and Paulus Ægineta: Pott has excelled every modern one.

HÆMORRHAGIA. (See *Hemorrhage.*)

HÆMORRHOIDES. (See *Hemorrhoids.*)

HARE-LIP. (*Labia Leporina.*) A fissure, or longitudinal division of one or both lips.

Children are frequently born with this kind of malformation, particularly of the upper lip. Sometimes the portions of the lip, which ought to be united, have a considerable interspace between them; in other instances they are not much apart. The cleft is occasionally double, there being a little lobe, or small portion of the lip, situated between the two fissures. Every species of the deformity has the same appellation of *hare-lip*, in consequence of the imagined resemblance which the part has to the upper lip of a hare.

The fissure commonly affects only the lip itself. In many cases, however, it extends along the bones of the palate, even as far as the uvula. Sometimes these bones are totally wanting; sometimes, they are only divided by a fissure.

Such a malformation is always peculiarly afflicting. In its least degree, it constantly occasions considerable deformity; and when it is more marked, it frequently hinders infants from sucking, and makes it indispensable to nourish them by other means. When the lower lip alone is affected, which is not most frequently the case, the child can neither retain its saliva, nor learn to speak, except with the greatest impediment. But when the fissure pervades the palate, the patient not only never articulates but very imperfectly, but cannot masticate nor swallow, except with great difficulty, on account of the food readily getting up into the nose.

After these remarks, it is obviously very important to cure the malformation as soon as possible. But as this object cannot be accomplished without an operation, attended with some degree of pain, several practitioners, as Dionis, Garengeot, and others, have advised waiting till the child is four or five years old, on the supposition, that, at an earlier age, the child's agitations and cries would render the operation impracticable, or derange all the proceedings taken to ensure its success. It is plain, however, that such reasons are not exceedingly weighty. A child four or five years old, and, very often, even one eight or ten years of age, is more difficult to manage, in this circumstance, than an infant only a few months old. There is no child, though advanced to that age, which has not a thousand times more dread of the pain than of the deformity, or of the inconveniences of the complaint, to which he is habituated; while an infant of tender years fears nothing, and only feels the pain of the moment.

A more rational objection is the liability of infants to convulsions after operations, and this has induced many excellent surgeons of the present day to advise postponing the cure of the hare-lip, till the child is about two years old. Perhaps this apprehension, however, does not vindicate the delay.

Mr. Sharp observes, "there are many lips, where the loss of substance is so great, that the edges of the fissure cannot be brought together, or, at best, where they can but just touch; in which case it need not be advised to forbear the attempt; it is likewise forbid in young chil-

dren, and with reason, if they suck; but otherwise it may be undertaken with great safety, and even with more probability of success than in others that are older." (*Operations in Surgery, chap.* 34.)

Le Dran has performed the operation on children of all ages, even on those at the breast. B. Bell did it with success on an infant only three months old. Muys advises it to be undertaken as soon as the child is six months old. Roonhuysen operated on children ten weeks after their birth, and all his contemporaries have praised his singular dexterity and success. This latter surgeon advises, as a step essential to the success of the operation, to hinder children from sleeping a certain time before undertaking it, in order that they may fall asleep immediately afterwards. Opiates have also been recommended to ensure this occurrence. M. Louis is of opinion, that the operation done without any suture will succeed better on infants, than any other method. This subject, however, we shall treat of in due time.

All practitioners entertain the same sentiment with regard to the object of this operation, which consists in reducing the preternatural solution of continuity to the state of a simple wound, by cutting off the edges of the separated parts throughout their length, and then approximating these parts, so as to make them continue in contact until they have completely grown together. But although such principles are admitted by all surgeons, all are not of the same opinion with respect to the method, which it is best to follow in practice; some having recourse to sutures to keep the edges of the wound in contact; others disapproving of the plan, and believing that a perfect cure may always be accomplished by means of adhesive plaster and a uniting bandage, so as to save the patient a great deal of pain, which sutures always occasion.

M. Louis has been the chief advocate for this method, which proscribes sutures, and he has published on this subject two very interesting memoirs, which we shall presently quote, for the purpose of informing the reader of the reasons, on which this celebrated man founded his opinion on this matter, and of the means which he employed.

M. Louis thought that the use of sutures, in the operation for the hare-lip, originated from a false idea which prevailed, respecting the nature of the disease. The fissure in the lip having been imprudently imputed to the loss of substance, it was thought impossible to keep the parts in contact, except by a suture.

"The separation of the edges of the fissure in the lip is only the effect of the retraction of the muscles, and is always proportioned to the extent of the cleft. Those who have hare-lips are capable of bringing the edges of the fissure together by muscular action, when they pucker up their mouths. On the other hand, the separation is considerably increased when such persons laugh, and the breach appears excessively large, after superficially paring off its edges on both sides. Hence, the interspace in the hare-lip must not be mistaken for a loss of substance. The truth of this is confirmed by the effects of sticking plaster, which has sometimes been applied to the hare-lip, as a preparatory measure before the operation, and which exceedingly lessens the separation of the parts.

"According to the confession of all who have written in favour of the twisted suture, it seems advisable only on the false idea, that the hare-lip is the effect of a greater or lesser loss of substance; and they say, positively, that we must not have recourse to it when there is only a simple division to be united. The twisted suture must then be proscribed from the operation for the natural hare-lip, since it is proved that this malformation is unattended with a loss of substance. But the loss of substance is but too real, after the extirpation of scirrhous and cancerous tumours, to which the lips are very subject. Yet, even in these very cases, the extensibility of the lips allows an attempt to be made to reunite the double incision, by which the tumour has been removed, and it succeeds without the smallest deformity, when care has been taken to direct each incision obliquely, so that both of them form, where they meet, an acute angle, in the base of which the tumour is comprised. It is on this occasion, that the means to procure an union ought to be the more efficacious, because the difficulty of keeping the edges of the wound approximated is greater. M. Pibrac has already shewn, in his memoir on the abuse of sutures, when speaking of the hare-lip, that they are badly conceived means, and more hurtful in proportion to the greater loss of substance, because the greater the interspace is between the two parts, the more fear is there of their efforts on the needles or pins left in the wound. Hence, care has always been taken to make the dressings aid the operation of the suture. After this consideration, judiciously made by the partisans of this plan, there was only one more step to be taken, according to M. Pibrac, in order to evince the necessity of proscribing it. The cap, or copper headpiece, described by Verduc and Nuck, for compressing the cheeks; the clasps of Heister; the strips of adhesive plaster, which no author has neglected expressly to recommend; all this has been invented in order to support the parts, and keep

them from being disunited. When the suture failed, it was by these means, that the original deformity was corrected, together with that produced by the laceration, which would not have occurred without the suture. As, then, the dressings, when methodically applied, are capable of effectually rectifying the mischief of the suture, why should they be considered only as a resource in a mere accidental case? Why should they not be made the chief and primary means of reuniting the lips, even when there is a loss of substance?

"Nothing can be opposed to the proofs adduced upon this point. They are even drawn from the practice of those, who have employed sutures without success. Such persons themselves have furnished the arguments in favour of the bandage being capable of repairing the mischief resulting from the twisted suture. Practitioners can only be vindicated in employing this suture by confessing, that the true principles of the art have not been established concerning this subject."

M. Louis, with a view of perfecting our notions on this matter, lays it down as a fact, that, the retraction of the muscles being the cause of the separation of the edges of the fissure, it is not to these edges we are to apply the force which is to unite them; but that it should be applied further to the very parts, whose action (the cause of the separation) is to be impeded, and whose contraction is thus to be prevented. A great many means for supporting the wound, only irritate the muscles and excite them to action, and it is this action which we should endeavour to overcome. The means for promoting a union can only be methodical, when directly employed to prevent such action, by an immediate application on the point where it is to be resisted. The facility, with which the parts may be brought forward, so as to bring the two commissures of the lips into contact, by the mere pressure of the hands, shews what may be expected from a very simple apparatus, which will execute the same office without any efforts, in a firm and permanent manner, and which will render sutures unnecessary, the inconveniences of which are too well known.

M. Louis, after having explained the reasons of the theory, on which he founded his method, relates several cases, taken either from his own practice, or that of others, to illustrate its advantages. He details the history of twenty cases, in which his plan perfectly succeeded, both in accidental hare-lips, with considerable loss of substance, and in natural ones. In most of these instances, however, it was thought proper to assist the bandage with one stitch at the extremity of the fissure, close to the vermilion border of the lip, for the purpose of keeping the parts securely on a level.

Notwithstanding the operation, as performed with the twisted suture, is opposed by an authority of such weight as that of M. Louis, still it is the one most commonly practised. Few practitioners doubt that a hare-lip may be cured by means of adhesive plaster, and uniting bandages, quite as perfectly as by a suture; and all readily allow, that the first of these methods, as being more simple and less painful, would be preferable to the latter one, if it were equally sure of succeeding. But it is considered far more uncertain in its effect. To accomplish a complete cure, the parts to be united must be maintained in perfect contact, until they have contracted the necessary adhesion; and how can we always depend upon a bandage keeping them from being displaced? What other means, besides a suture, affords in this respect such perfect security?

We shall not take upon us to decide which of these two methods is the best, contenting ourselves with explaining the mode of proceeding in both, and leaving it for surgeons to determine, by their own experience, and the evidence of facts, which one merits the difference. First, of the ancient plan.

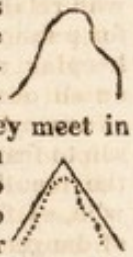
Having placed the patient in a convenient situation, the first thing is to examine whether there is any adhesion of the lip to the gum; and, if there be one, to divide it with a knife. Some authors (*Sharp*) recommend always dividing the frænulum, which attaches the lip to the gum; but, when the hare-lip is at some distance from this part, and will not be in the way in the operation, there is no need of dividing it; but, when the frænulum is situated in the centre of the division, it is clear that, in operating, we must necessarily include it in the incision, and it must be divided before-hand, taking care not to encroach too much upon the gum, lest the alveolary process should be laid bare; nor too much upon the lip, because making it thinner would be unfavourable to its union.

Sometimes one of the incisor teeth being opposite the fissure, and projecting forward, must be drawn, lest it should distend and irritate the parts, after they have been brought into contact.

Sometimes also, but particularly in cases in which there is a cleft in the bony part of the palate, a portion of the os maxillare superius forms such a projection, just in the situation of the fissure in the lip, that it would render the union very difficult, if not impracticable. In this circumstance, the only plan is to cut off the projecting angles of bone, which may easily be done with a strong pair of bone-nippers.

In the operation, the grand object is to

make the wound as smooth and even a cut as possible, in order that it may more certainly unite by the first intention, and of such a shape, that the cicatrix may form only one narrow line. The edges of the fissure should, therefore, never be cut off with scissars, which always bruise the fibres which they divide, and a sharp knife is always to be preferred. The best plan is, either to place any flat instrument, such as a spatula, underneath one portion of the lip, and then holding the part stretched and supported on it, to cut away the whole of the callous edge; or else to hold the part with a pair of forceps, the under blade of which is much broader than the upper one: the first serves to support the lip; the other contributes also to this effect, and, at the same time, serves as a sort of ruler in guiding the knife in an accurately straight line. When the forceps are preferred, the surgeon must of course leave on the side of the upper blade, just as much of the edge of the fissure as is to be removed, so that it can be cut off with one sweep of the knife. This is to be done on each side of the cleft, observing the rule, to make the new wound in straight lines, because the sides of it can never be made to correspond without this caution. For instance, if the hare-lip had this shape, the incision of the edges must be continued in straight lines, till they meet in the manner here represented. In short, the two incisions are to be perfectly straight, and are to meet at an angle above, in order that the whole track of the wound may be brought together, and united by the first intention.



Two silver pins, made with steel points, are next to be introduced through the edges of the wound, so as to keep them accurately in contact. A piece of thread is then to be repeatedly wound round the ends of the pins, from one side of the division to the other, first transversely, then obliquely, from the right or left end of one pin above, to the opposite end of the lower one, &c. Thus the thread is made to cross as many points of the wound as possible, which greatly contributes to maintaining its edges in even apposition. It is obvious, that a great deal of exactness is requisite in introducing the pins, in order that the edges of the incision may afterwards be precisely applied to each other. For this purpose, some previously place the sides of the wound in the best position, and mark with a pen the points at which the pins should enter, and come out again. The pins ought never to extend more deeply than about two-thirds through the substance of the lip, and it would be a great improvement always to have them constructed a little curved, as this is the course which they naturally ought to take when introduced. The steel points should also admit of being easily taken off, when the pins have been applied; and, perhaps, having them to screw off and on is the best mode, as removing them in this way is not so likely to be attended with any sudden jerk, which might be injurious to the wound, as if they were made to pull off. The pins may commonly be safely removed in about four days, after which the support of sticking-plaster will be quite sufficient.

The process we have just been describing, is what is well known by the name of the *twisted suture*.

It is worthy of attention, that this suture is applicable to other surgical cases, in which the grand object is to heal some fistula or opening, by the first intention. Mr. Sharp says, it is of great service in fistulæ of the urethra, remaining after the operation for the stone, in which case the callous edges may be cut off, and the lips of the wound held together by the above method.

What has hitherto been stated, refers to the most simple form of the hare-lip, viz. to that which presents only one fissure. When there are two clefts, the cure is accomplished on the same principles; but, it is more difficult of execution; indeed, so much so, that the old surgeons, until the time of Heister, have almost all regarded the operation for the double hare-lip, as impracticable, though they have described it, directing us to operate on each fissure, just as if there were only one. M. de la Faye, however, performed this operation with success, as may be learnt in the *Mémoires de l'Acad. de Chirurgie, Tom. 4. 4to.* But, we are indebted to M. Louis for having obviated all the difficulties, by simply proposing to do the operation at two times, and to await the perfect cure of one of the fissures, before undertaking that of the other. Heister seems to have conceived a similar idea, about the same time, but he never put it in practice, nor did he even positively advise it.

In cutting off the edges of the fissure, the incision must be carried to the upper part of the lip; and even when the fissure does not reach wholly up the lip, the same thing should be done; for, in this manner the sides of the wound will admit of being applied together more uniformly, and the cicatrix will have a better appearance. We should also not be too sparing of the edges which are to be cut off. Practitioners, says M. Louis, persuaded that the hare-lip was a division with loss of substance, have invariably advised the removal of the *callous* edges. But, in the natural hare-lip there is no callosity; the margins of the fissure are

composed, like those of the lip itself, of a pulpy, fresh-coloured, vermilion flesh, covered with an exceedingly delicate cuticle. The whole of the part having this appearance, must be taken away, even encroaching a little way on the true skin. At the lo er part of the fissure, towards the nearest commissure, a rounded red substance is commonly situated, which it is absolutely necessary to include in the incision. Were this neglected, the union below would be unequal, and, through an injudicious economy, a degree of deformity would remain, which is alway sunpleasant, when it can be avoided. The grand object, however, is to make the two incisions diverge at an acute angle, so that the edges may be put into reciprocal contact their whole length, without the least inequality.

M. Louis used to operate as follows: the patient being seated in a good light, his head is to be supported on an assistant's breast, who, with the fingers of both hands, pushes the cheeks forward, in order to bring the edges of the fissure near to each other. These are to be laid on a piece of pasteboard, which is to be put between the jaw and lip, and be an inch and a half long, from twelve to fifteen lines broad, and at most one line thick. The upper end should be rounded, by flattening the corners. To facilitate the incision, the lip is to be stretched over the pasteboard, the operator holding one portion over the right with the thumb and index finger of the left hand, while the assistant does the same thing on the left side. Things being thus disposed, the edges of the hare-lip are to be cut off with two sweeps of the bistoury, in two oblique lines, forming an acute angle above the fissure.

For a long while scissars were preferred to a knife, for cutting off the edges of the hare-lip; but, they are now very generally disused for this purpose. The pinching and bruising, which result from the action of the two blades, in overlapping each other, are deemed obstacles to the union of the sides of the wound; for, the bruised fibres must necessarily suppurate; and, slight as this may be, the cure is at least retarded by it. Let not practitioners be led by Mr. B. Bell's stating, that in one instance he cut off one side of the fissure with a knife, and the other with scissars; that the latter cut produced least pain, and that on this side there was no more swelling nor inflammation than on the opposite one.

The pins should be introduced at least two-thirds of the way through the substance of the lip, lest a furrow should remain on the inside of the part, which might prove troublesome, by allowing pieces of food to lodge in it. There is, however, a stronger reason for attending to this circumstance, viz. the hemorrhage which may take place when it is neglected. The bleeding almost always ceases, as soon as the edges of the wound have been brought together by means of the suture, when the pins are properly placed; but, when they have not been introduced deeply enough, the posterior surfaces of the incisions not been applied to each other, the blood may continue to run into the mouth, and give the surgeon an immense deal of trouble. In the memoir written by Louis, there is a history of a case, in which the patient died in consequence of such an accident. Persons who had undergone the operation, were always advised to swallow their spittle, even though mixed with blood, in order to avoid disturbing the wound, by getting rid of it otherwise. In the case alluded to, the patient, who had been operated upon for a cancer which he had in the lip, swallowed the blood as he had been directed to do, and he bled so profusely that he died. On the examination of the body, the stomach, and small intestines were found full of blood. "This deplorable case," says the illustrious author who relates it, "deserves to be recorded for public instruction, for the purpose of keeping alive the attention of surgeons on all occasions, where, in consequence of any operation whatsoever, there is reason to fear any bleeding in the cavity of the mouth. Platner is the only writer, who, as far as I know, foresaw this kind of danger. The bleeding from the edges of the wound stops of itself, (says he) as soon as they have been brought into contact, and stitched together; but, care must be taken that the patient does not swallow the blood, which might make him vomit, or else suffocate him. Hence, his head should be elevated, that the blood may escape externally, a precaution more particularly necessary in regard to young children."

Having described the mode of operating for the hare-lip, as approved of by the generality of practitioners, and detailed every thing which seemed material, we have now only to describe the method which M. Louis adopted. His sentiments respecting several particular points of the operation, have been already stated; and an account of the means which he employed, in lieu of the twisted suture, for uniting the edges of the wound, is all that we have to offer farther on the present subject.

Different authors, as already mentioned, have devised bandages for supporting the two portions of the divided lip, and lessening the pressure which they make against the pins designed for uniting them. Franco and Quesnay, in parti-

cular, have described two kinds, which have been considered very well calculated for this object; and these means were not only employed as auxiliary, but even sometimes as curative ones, when it was impossible to use needles. To such bandages, too complicated and too uncertain, in their effect, M. Louis prefers a simple linen roller, one inch wide, three ells long, and rolled up into two unequal heads. He begins with applying the body of this bandage to the middle of the forehead; he unrolls the two heads, from before backward, above the ears between the upper part of the cartilage, and the cranium, in order to make them cross on the nape of the neck, and then be carried forward again. The assistant, who supports the head, and pushes forward the cheeks, must lift up the ends of his fingers, in the place of which, on each side, a thick compress is to be put. This being covered, and pushed from behind forward, by the roller, will constantly perform the office of the assistant's fingers, who is to continue to support the apparatus, until it is all completely applied. The longest of the two heads of the roller, being slit in two places near the lip, presents two parallel openings; the remnant of the shortest one is divided into two parts, as far as its end. The two little narrow bands, in which it terminates, must be passed through the openings of the former, and made to cross upon the middle of the lip. The ends of the roller, being carried from before backward, are then to be made to cross again on the nape of the neck, where the shortest is to end. The remainder of the long one is to be employed in making turns round the head. This bandage may be rendered much more stable, by a piece of tape, which is to pass the forehead, over the sagittal suture, and be pinned at each end to the circumvolutions of the roller; while a second piece of tape is to cross the first one at the top of the head, and also to be attached, at its extremities, to the uniting bandage, and the compresses, placed under the zygomatic arches, for the purpose of pushing forward the cheeks.

This bandage is extremely simple, and would promise great advantages, even if its success had not been already proved by the cures which it has effected under the hands of its inventor, and several other surgeons, who have employed it, in consequence of his recommendation. Perhaps, if it has not been equally successful with others, this is rather owing to the defective manner of applying, than to any fault in the plan itself. However it may be, it is much to be wished that this means were sufficiently certain in its effect, to become more generally adopted, so that the suture might be relinquished.

All that we have said concerning the operation for the hare-lip, is equally applicable, not only to the treatment of cancer of the lip, but also to that of accidental cuts, or lacerations, of this part, from any cause whatsoever. We shall only remark that, in a recent wound, all the duty of the surgeon is to have recourse immediately, either to the twisted suture, or the uniting bandage.

In cases, in which the fissure affects the bones forming the roof of the mouth, after the soft parts have been united in the manner above related, the bones, and other separated parts, are ordinarily observed to become approximated, and nature thus corrects, more or less, this kind of deformity. But this does not always happen, and when these parts remain so considerably separated, as to obstruct speech and deglutition, or cause any other inconvenience, a plate of gold or silver, exactly adapted to the arch of the palate, and steadied by means of a piece of sponge, fixed to its convex side, and introduced into the cleft, may sometimes be usefully employed. When the sponge is of suitable size, and very dry, before being used, it will be swelled by the moisture of the adjacent parts, which alone will be sufficient, in many cases, to keep it in its situation, so as greatly to facilitate speaking and swallowing. Sometimes, however, the fissure is so shaped, that the sponge cannot be fixed in it: this principally happens when the opening widens very much, as it approaches externally. In such cases it has been proposed to fix a plate of gold, by means of springs, made of the same metal, so constructed as to fit the cavity; but, no contrivance seems yet to have answered.

On the subject of the hare-lip, consult *B. Bell's Surgery, Vol.* 4. *Heister's Surgery. Le Dran's Operations; Sharp's Operations; Latta's Surgery, Vol.* 2; *L'Encyclopédie Méthodique, Partie Chirurgicale, Art. Bec. de Lievre. The Observations of M. Louis, in Mém. de l'Acad. de Chirurgie. Tom.* 4. *in* 4*to. De la MedecineOpératoire, par Sabatier, Tom.* 3. *Œuvres Chirurgicales de Desault, par Bichat, Tom.* 2. *Traité des Opérations de Chirurgie, par A. Bertrandi, Chap.* 19. *Richter's Anfangsgrunde der Wundarzneykunst, Band* 2. *Kap.* 7. *Richerand's Nosographie Chirurgicale, Tom.* 3. *p.* 245, *&c. Edit.* 2. *Lassus, Pathologie Chirurgicale, Tom.* 2, *p.* 451, *&c. Edit.* 2.

HEAD, INJURIES OF.

Mr. Pott remarks, that, though the scalp be called the common tegument of

the head, yet, from the variety of parts of which it is composed, from their structure, connexions, and uses, injuries done to it by external violence, become of much more consequence, than the same kind of ills can prove, when inflicted on the common teguments of the rest of the body.

Passing over incised wounds, which have no particularity, Mr. Pott proceeds immediately to those which, (though the mischief is originally confined to the mere scalp) yet are frequently very terrible to behold, are often attended with alarming symptoms, and sometimes with danger. Lacerated and punctured wounds, are those referred to. "The former may be reduced to two kinds, viz. those in which the scalp, though torn, or unequally divided, still keeps its natural situation, and is not stript nor separated from the cranium, to any considerable distance beyond the breadth of the wound; and those, in which it is considerably detached from the parts it ought to cover.

"The first of these, if simple, and not combined with the symptoms, or appearances of any other mischief, do not require any particular or different treatment, from what the same kind of wounds require on all other parts; but the latter, (those in which the scalp is separated and detached from the parts it ought to cover) are not only, by the different methods in which they may be treated, frequently capable of being cured with a considerable deal more or less ease and expedition, but are also sometimes a matter of great consequence to the health and well-being of the patient."

Mr. Pott makes no scruple of declaring it as his opinion, that the preservation of the scalp ought always to be attempted, *unless it be so torn as to be absolutely spoiled, or there are manifest present symptoms of other mischief.* This kind of wound is sometimes very terrible to look at, and they who have not been accustomed to see it, may be inclined to think there is no remedy but excision; but, Mr. Pott says, he has so often made the experiment of endeavouring to preserve the torn piece, and so often succeeded, that he would recommend it as a thing always to be attempted, even though a part of the cranium should be perfectly bare. The removal of it necessarily produces a larger sore, which must require a good deal of time to heal, and must leave considerable deformity: the preservation of it prevents both.

Here we may remark, that all practitioners now invariably avoid cutting away the scalp, even in the circumstances, in which such practice was allowed by Pott. By *spoiled* this eminent writer must mean so injured as necessarily to slough afterwards. However, as no harm results from taking the chance of its not sloughing, which never can be with certainty foretold; and as the excision of the part is painful, and productive of no benefit, even if sloughing must follow, such operation is, in every point of view, quite wrong. With respect to other mischief, as a reason, the examination of the cranium, and even trephining, never require any of the scalp to be cut away. See *Trephine.*

Let the surgeon, therefore, always make the torn piece clean from all dirt, or foreign bodies, and restore it as quickly, and as perfectly as he can, to its natural situation.

Notwithstanding Mr. Pott assents to the employment of sutures, for uniting certain lacerated wounds of the scalp, we may state, that the best practitioners of the present day only employ sticking-plaster. Sometimes, the loosened scalp will unite with the parts from which it was torn and separated, and there will be no other sore than what arises from the impracticability of bringing the lips of the wound into smooth and immediate contact, the scar of which sore must be small in proportion. Sometimes such perfect re-union is not to be obtained; in which case, matter will be formed and collected in those places where the parts do not coalesce: but this does not necessarily make any difference, either in the general intention, or in the event; this matter may easily be discharged, by one or two small openings made with a lancet; the head will still preserve its natural covering; and the cure will be very little retarded by a few small abscesses.

In some cases (as Pott proceeds to describe), the whole separated piece will unite perfectly, and give little or no trouble, especially in young and healthy persons. In some, the union will take place in some parts and not in others; and, consequently, matter will be formed, and require to be discharged, perhaps at several different points; and, in some particular cases, circumstances, and habits, there will be no union at all, the torn cellular membrane, or the naked aponeurosis, will inflame, and become sloughy, a considerable quantity of matter will be collected, and, perhaps, the cranium will be denuded. But, even in this state of things, which does not very often happen, where care has been taken, and is almost the worst which can happen, in the case of mere simple laceration and detachment, if the surgeon will not be too soon, nor too much alarmed, nor in a hurry to cut, he will often find the cure much more feasible than he may at first

imagine: let him take care to keep the inflammation under by proper means, let him have patience till the matter is fairly and fully formed, and the sloughs perfectly separated, and when this is accomplished, let him make a proper number of dependent openings for the discharge of them, and let him by bandage, and other proper management, keep the parts in constant contact with each other, and he will often find, that although he was foiled in his first intention of procuring immediate union, yet he will frequently succeed in this his second; he will still save the scalp, shorten the cure, and prevent the great deformity arising, (particularly to women) not only from the scar, but from the total loss of hair.

This union may often be procured, even though the cranium should have been perfectly denuded by the accident; and, it is true, not only though it should have been stripped of its pericranium at first, but even if that pericranium should have become sloughy and cast off, as Mr. Pott has often seen.

"Exfoliation from a cranium laid bare by external violence, and to which no other injury has been done, than merely stripping it of its covering, is a circumstance (says Pott) which would not so often happen, if it was not taken for granted that it must be, and the bone treated according to such expectation. The soft open texture of the bones of children and young people, will frequently furnish an incarnation, which will cover their surface, and render exfoliation quite unnecessary; and even in those of mature age, and in whom the bones are still harder, exfoliation is full as often the effect of art as the intention of nature, and produced by a method of dressing, calculated to accomplish such end, under a supposition of its being necessary. Sometimes, indeed, it happens that a small scale will necessarily separate, and the sore cannot be perfectly healed till such separationhas been made; but this kind of exfoliation will be very small and thin, in proportion to that produced by art, that is, that produced by dressing the surface of the bare bone with spirituous tinctures, &c. and when a wound on the head, with a sound uninjured bone, denuded by accident, shews a disposition to heal without exfoliation, it never can be right to counteract nature, and oblige her to do what she is not inclined to, and which she would accomplish her purpose better without doing.

"Small wounds, that is, such as are made by instruments, or bodies which pierce, or puncture, rather than cut, are in general more apt to become inflamed, and to give trouble, than those which are larger, and in this part particularly, are sometimes attended with so high inflammation, and with such symptoms as alarm both patient and surgeon."

The parts capable of being hurt by such kind of wound, are the skin, the cellular membrane, the expanded tendons of the muscles of the scalp, and the pericranium.

"If the wound affects the cellular membrane only, and has not reached the aponeurosis or pericranium, the inflammation and tumour affect the whole head and face, the skin of which wears a yellowish cast, and is sometimes thick set with small blisters, containing the same coloured serum; it receives the impression of the fingers, and becomes pale for a moment, but returns immediately to its inflamed colour; it is not very painful to the touch, and the eye-lids and ears are always comprehended in the tumefaction, the former of which are sometimes so distended, as to be closed; a feverish heat and thirst generally accompany it; the patient is restless, has a quick pulse, and most commonly a nausea, and inclination to vomit.

"This accident generally happens to persons of bilious habit, and is indeed an inflammation of the erysipelatous kind; it is somewhat alarming to look at, but is not often attended with danger. The wound does indeed neither look well, nor yield a kindly discharge, while the fever continues, but still it has nothing threatening in its appearance, none of that look which bespeaks internal mischief; the scalp continues to adhere firmly to the skull, and the patient does not complain of that tensive pain, nor is afflicted with that fatiguing restlessness which generally attends mischief underneath the cranium.

"Phlebotomy, lenient purges, and the use of the common febrifuge medicines, particularly those of the neutral kind, generally remove it in a short time. When the inflammation is gone off, it leaves on the skin a yellowish tint, and a dry scurf, which continue until perspiration carries them away, and upon the disappearance of the disease, the wound immediately recovers a healthy aspect, and soon heals without any farther trouble.

"Wounds and contusions of the head, which affect the brain and its membranes, are also subject to an erysipelatous kind of swelling and inflammation; but it is very different, both in its character and consequences, from the preceding.

"In this, (which is one of the effects of inflammation of the meninges,) the febrile symptoms are much higher, the

pulse harder and more frequent, the anxiety and restlessness extremely fatiguing, the pain in the head intense; and as this kind of appearance is, in these circumstances, most frequently the immediate precursor of matter forming between the skull and dura mater, it is generally attended with irregular shiverings, which are not followed by a critical sweat, nor afford any relief to the patient. To which it may be added, that in the former case the erysipelas generally appears within the first three or four days; whereas in the latter, it seldom comes on till several days after the accident, when the symptomatic fever is got to some height. In the simple erysipelas, although the wound be crude and undigested, yet it has no other mark of mischief; the pericranium adheres firmly to the skull, and upon the cessation of the fever, all appearances become immediately favourable. In that which accompanies injury done to the parts underneath, the wound not only has a spongy, glassy, unhealthy aspect, but the pericranium in its neighbourhood separates spontaneously from the bone, and quits all cohesion with it. In short, one is an accident, proceeding from a bilious habit, and not indicating any mischief beyond itself; the other is a symptom, or a part of a disease, which is occasioned by injury done to the membranes of the brain; one portends little or no ill to the patient, and almost always ends well; the other implies great hazard, and most commonly ends fatally. It is therefore hardly necessary to say, that it behoves every practitioner to be careful in distinguishing them from each other.

"If the wound be a small one, and has passed through the cellular membrane to the aponeurosis, and pericranium, it is sometimes attended with very disagreeable, and even very alarming symptoms, but which arise from a different cause, and are very distinguishable from what has been yet mentioned.

"In this, the inflamed scalp does not rise into that degree of tumefaction, as in the erysipelas, neither does it pit, or retain the impression of the fingers of an examiner; it is of a deep red colour, unmixt with the yellow tint of the erysipelas; it appears tense, and is extremely painful to the touch; as it is not an affection of the cellular membrane, and as the ears and the eye-lids are not covered by the parts in which the wound is inflicted, they are seldom, if ever, comprehended in the tumour, though they may partake of the general inflammation of the skin; it is generally attended with acute pain in the head, and such a degree of fever as prevents sleep, and sometimes brings on a delirium.

"A patient in these circumstances, will admit more free evacuations by phlebotomy, than one labouring under an erysipelas; the use of warm fomentation is required in both, in order to keep the skin clean and perspirable, but an emollient cataplasm, which is generally forbid in the former, may in this latter case be used to great advantage.

"When the symptoms are not very pressing, nor the habit very inflammable, this method will prove sufficient: but it sometimes happens, that the scalp is so tense, the pain so great, and the symptomatic fever so high, that by waiting for the slow effect of such means, the patient runs a risk from the continuance of the fever, or else the injured aponeurosis and pericranium becoming sloughy, produce an abscess, and render the case both tedious and troublesome. A division of the wounded part by a simple incision down to the bone, about half an inch or an inch in length, will most commonly remove all the bad symptoms, and if it be done in time, will render every thing else unnecessary." (*Pott.*)

The injuries, to which the scalp is liable from contusion, or the appearances produced in it by such general cause, may be divided into those in which the mischief is confined merely to the scalp; and those in which other parts are interested.

The former, which only comes under our present consideration, is not indeed of importance, considered abstractedly. The tumour attending it is either very easily dissipated, or the extravasated blood causing it, is easily got rid off by a small opening. Mr. Pott particularly notices this case, on account of an accidental circumstance, which sometimes attends it, and renders it liable to be very much mistaken.

"When the scalp receives a very smart blow, it often happens that a quantity of extravasated blood immediately forms a tumour, easily distinguishable from all others, and generally very easily cured. But it also sometimes happens, that this kind of tumour produces to the fingers of an unadvised or inattentive examiner, a sensation, so like to that of a fracture, with depression of the cranium, as may be easily mistaken." Now, if, upon such supposition, a surgeon immediately makes an incision into the tumid scalp, he may give his patient a great deal of unnecessary pain, and for that reason run some risk of his own character.

"The touch is, in this case, so liable to deception, that recourse should always be had to other circumstances and symptoms, before an opinion be given.

"If a person, with such tumour occasioned by a blow, and attended with such

appearances, and feel, has any complaint, which seems to be the effect of pressure made on the brain and nerves, or of any mischief done to the parts within the cranium, the division or removal of the scalp in order to enquire into the state of the skull, is right and necessary; but if there are no such general symptoms, and the patient is in every respect perfectly well, the mere feel of something like a fracture will not authorize or vindicate such operation, since it will often be found, that such sensation is a deception, and that when the extravasated fluid is removed, or dissipated, the cranium is perfectly sound and uninjured.

"The second kind of tumour attending the contused scalp, viz. that which arises from injury done to the cranium, and parts within, does so absolutely proceed from and depend upon such injury, as not to fall under our consideration in this place at all, but will be considered at large when we come to speak of the mischiefs done to the skull and brain by collision, or contusion.

"From what has been said it appears, that the scalp, taken in a general sense, is, when wounded or bruised, liable to be affected with four kinds of tumour, each of which has a distinct cause, and requires, or permits, a different method of treatment.

"The first does not imply any injury done to the parts within the skull, requires no operation, and almost always is cured by general remedies.

"The second, or that which is caused by the spontaneous separation of the pericranium from the skull, in consequence of internal mischief, is not at first attended with very pressing symptoms; but whoever has observed their progress, and attended to their event, must know what fatal and frequently irresistible evil it is the forerunner of, nothing less than the inflammation and putrefaction of the membranes of the brain, and the formation of matter between them and the skull; and that is a case which, of all others, will least admit delay.

"The third, though it sometimes gives way to free evacuation, and lenient external applications, yet is sometimes also attended with symptoms which are too pressing to wait the effect of such remedies, and is capable of being immediately relieved by a division of the inflamed and irritated parts: whereas the same incision, made into the first kind of tumefaction, would most probably exasperate the disease, and heighten the symptoms.

"The fourth, consisting of extravasated blood, seldom requires any chirurgic operation; time, and the use of the common discutient applications, (of which the *lotio salis ammoniaci* is best,) almost always dissipate it; and it only becomes of consequence, by the possibility of its being misunderstood and mistreated."—(*Pott on Injuries of the Head.*)

2. *Effects of Contusion on the Dura Mater and Parts within the Skull.*

Mr. Pott remarks, "that in order to understand rightly, and to have a clear idea of, this kind of injury, it is necessary to recollect, that the vessels of the pericranium, those of the diploe, or medullary substance between the two tables of some parts of the cranium, and those of the dura mater within it, do all constantly and freely communicate with each other; and that this communication is carried on by means of innumerable foramina, found in all parts of both surfaces of the skull, as well as at the sutures; that upon the freedom of this communication depends the healthy and sound state of all the parts concerned in it; and that from the interruption or destruction of this, proceed most of the symptoms attending violent contusions of the head, extravasations of fluid between the cranium and dura mater, inflammations of the said membrane, and simple undepressed fracture of the skull.

"The pericranium is so firmly attached to the outer surface of the skull, as not to be separable from it without considerable violence; and when such violent separation is made in a living subject (especially if young), the cranium is always seen to bleed freely, from an infinite number of small foramina. The dura mater, which is a firm strong membrane, is almost as intimately attached to the inside of the skull, as the pericranium is to the outside, and by the same means, viz. by vessels; and by these means a constant circulation and communication are preserved and maintained between the two membranes and the bones dividing them. This, all the appearances which attend the scalping a living person, or the separation of the skull from the dura mater of a dead one, (especially if such person died apoplectic, or was hanged) prove beyond all doubt; in the former, the blood will be seen issuing from every point of the surface of the cranium; in the latter, not only a considerable degree of force will be found necessary to detach the sawn bone from the subjacent membrane, but when it is removed, a great number of bloody points will be seen all over the surface of the latter; which points, if wiped clean, do immediately become bloody again, being only the extremities of broken vessels. These vessels are largest at, and about the sutures, at which places the adhesion is the strongest, and the hemorrhage upon separation the greatest.

"It has been thought by many that the dura mater was attached to the skull, only at the sutures; that in all other parts it was loose and unconnected with it; and that it constantly enjoyed or performed an oscillatory kind of motion, and was alternately elevated and depressed. This idea and opinion were borrowed from the appearance which the dura mater makes in a living subject after a portion of the skull has been removed: but although it has been inculcated by writers of great eminence, yet it has no foundation in truth or nature, and has misled many practitioners in their opinions, not only of the structure and disposition of this membrane, but in their ideas of its diseases.

"The dura mater does on the internal surface of the bones of the cranium, the office of periosteum, in the same manner as the pericranium does on the external; (at least they have no other:) to this it is so firmly, and so generally attached, as to be incapable of any, even the smallest degree of motion. The alternate elevation and subsidence of it, which are observable when any portion of it is laid bare, are owing to a very different cause from any power in itself; neither is, nor can ever be performed, until a piece of the cranium has been forcibly taken away; and consequently cannot possibly be natural, or necessary.

"By blows, falls, and other shocks, some of the larger of those vessels which carry on this communication between the dura mater and the skull are broken, and a quantity of blood is shed upon the surface of that membrane. This is one species of bloody extravasation, and indeed the only one which can be formed between the skull and dura mater. If the broken vessels be few, and the quantity of blood which is shed be small, the symptoms are generally slight, and by proper treatment disappear. If they are large, or numerous, or the quantity of extravasated fluid considerable, the symptoms are generally urgent in proportion; but whether they be slight, or considerable, whether immediately alarming or not, they are always, and uniformly, such as indicate pressure made on the brain and nerves, viz. stupidity, drowsiness, diminution or loss of sense, speech, and voluntary motion.

"This every practitioner knows to be one frequent consequence of blows on the head. But it also often happens, from the same kind of violence, that some of the small vessels, which carry on the circulation between the pericranium, skull, and dura mater, are so damaged, as not to be able properly to execute that office, although there are none so broken as to cause an actual effusion of blood.

"Smart and severe strokes on the middle part of the bones, at a distance from the sutures, are most frequently followed by this kind of mischief; the coats of the small vessels, which sustain the injury, inflame and become sloughy, and, in consequence of such alteration in them, the pericranium separates from the outside of that part of the bone, which received the blow, and the dura mater from the inside, the latter of which membranes, soon after such inflammation, becomes sloughy also, and furnishes matter, which matter being collected between the said membrane and the cranium, and having no natural outlet, whereby to escape, or be discharged, brings on a train of very terrible symptoms, and is a very frequent cause of destruction. The effect of this kind of violence is frequently confined to the vessels connecting the dura mater to the cranium, in which case the matter is external to the said membrane; but it sometimes happens, that by the force either of the stroke or of the concussion, the vessels which pass between and connect the two meninges are injured in the same manner; in which case, the matter formed in consequence of such violence is found on the surface of the brain, or between the pia and dura mater, as well as on the surface of the latter; or perhaps in all these three situations at the same time.

"The difference of this kind of disease, from either an extravasation of blood, or a commotion of the medullary parts of the brain, is great and obvious. All the complaints produced by extravasation, are, such as proceed from pressure, made on the brain and nerves, and obstruction to the circulation of the blood through the former; stupidity, loss of sense and voluntary motion, laborious and obstructed pulse and respiration, &c. and (which is of importance to remark,) if the effusion be at all considerable, these symptoms appear immediately, or very soon after the accident.

"The symptoms attending an inflamed or sloughy state of the membranes, in consequence of external violence, are very different; they are all of the febrile kind, and never, at first, imply any unnatural pressure; such are, pain in the head, restlessness, want of sleep, frequent and hard pulse, hot and dry skin, flushed countenance, inflamed eyes; nausea, vomiting, rigor; and toward the end, convulsion, and delirium. And none of these appear at first, that is, immediately after the accident; seldom until some days are past.

"One set or class of symptoms is produced by an extravasated fluid, making such pressure on the brain and origin of the nerves, so as to impair or abolish vo-

luntary motion and the senses; the other is caused by the inflamed or putrid state of the membranes covering the brain, and seldom affects the organs of sense, until the latter end of the disease, that is, until a considerable quantity of matter is formed, which matter must press like any other fluid."

Mr. Pott next refutes the generally received opinion, that blood shed from its vessels, and remaining confined in one place, will become pus; and that the matter found on the surface of the dura mater, toward the end of these cases, was originally extravasated blood. Both these positions are false. That pure blood shed from its vessels, by means of external violence, and kept from the air, will not turn to, or become matter, is proved incontestably by every day's experience, in many instances, in aneurisms by puncture, in retained menses by imperforate vaginæ, and in all ecchymoses. True pus cannot be made from blood merely, as may be known from the manner in which all abscesses are formed, and from every circumstance attending suppuration; and that the matter found on the surface of the dura mater, after great contusions of the head, never was mere blood, Mr. Pott is as certain, as observation and experience can make him.

"If there be neither fissure nor fracture of the skull, nor extravasation, nor commotion underneath it, and the scalp be neither considerably bruised, nor wounded, the mischief is seldom discovered or attended to for some few days. The first attack is generally by pain in the part which received the blow. This pain, though beginning in that point, is soon extended all over the head, and is attended with a languor, or dejection of strength and spirits, which are soon followed by a nausea, and inclination to vomit, a vertigo or giddiness, a quick and hard pulse, and an incapacity of sleeping, at least quietly. A day or two after this attack, if no means preventive of inflammation are used, the part stricken generally swells, and becomes puffy, and tender, but not painful; neither does the tumour rise to any considerable height, or spread to any great extent: if this tumid part of the scalp be now divided, the pericranium will be found of a darkish hue; and either quite detached, or very easily separable from the skull, between which and it will be found a small quantity of a dark-coloured ichor.

"If the disorder has made such progress, that the pericranium is quite separated and detached from the skull, the latter will even now be found to be somewhat altered in colour from a sound healthy bone. Of this alteration it is not very easy to convey an idea by words, but it is a very visible one, and what some very able writers have noticed.

"From this time the symptoms generally advance more hastily and more apparently; the fever increases, the skin becomes hotter, the pulse quicker and harder, the sleep more disturbed, the anxiety and restlessness more fatiguing; and to these are generally added irregular rigors, which are not followed by any critical sweat, and which, instead of relieving the patient, add considerably to his sufferings. If the scalp has not been divided or removed, until the symptoms are thus far advanced, the alteration of the colour of the bone will be found to be more remarkable; it will be found to be whiter and more dry than a healthy one; or, as Fallopius has very justly observed, it will be found to be more like a dead bone: the sanies, or fluid, between it and the pericranium will also, in this state, be found to be more in quantity, and the said membrane will have a more livid diseased aspect.

"In this state of matters, if the dura mater be denuded, it will be found to be detached from the inside of the cranium, to have lost its bright silver hue, and to be, as it were, smeared over with a kind of mucus, or with matter, but not with blood. Every hour after this period, all the symptoms are exasperated, and advance with hasty strides: the head-ach and thirst become more intense, the strength decreases, the rigors are more frequent, and at last convulsive motions, attended in some with delirium, in others with paralysis, or comatose stupidity, finish the tragedy.

"If the scalp has not been divided till this point of time, and it be done now, a very offensive discoloured kind of fluid will be found lying on the bare cranium, whose appearance will be still more unlike to the healthy natural one; if the bone be now perforated, matter will be found between it and the dura mater, generally in considerable quantity, but different in different cases and circumstances. Sometimes it will be in great abundance, and diffused over a very large part of the membrane; and sometimes the quantity will be less, and consequently the space which it occupies smaller. Sometimes it lies only on the exterior surface of the dura mater; and sometimes it is between it and the pia mater, or also even on the surface of the brain, or within the substance of it.

"The primary and original cause of all this, is the stroke upon the skull: by this the vessels which should carry on the circulation between the scalp, pericranium, skull, and meninges, are injured, and no means being used to prevent the impend-

ing mischief, or such as have been made use of proving ineffectual, the necessary and mutual communication between all these parts ceases, the pericranium is detached from the skull, by means of a sanies discharged from the ruptured vessels, the bone being deprived of its due nourishment and circulation loses its healthy appearance, the dura mater (its attaching vessels being destroyed, or rendered unfit for their office) separates from the inside of the cranium, inflames and suppurates.

"Whoever will attend to the appearances which the parts concerned make in every stage of the disease, to the nature of the symptoms, the time of their access, their progress, and most frequent event, will find them all easily and fairly deducible from the one cause, which has just been assigned, viz. the contusion. As the inflammation and separation of the dura mater, is not an *immediate* consequence of the violence, so neither are the symptoms immediate, seldom until some days have passed; the fever at first is slight, but increases gradually; as the membrane becomes more and more diseased, all the febrile symptoms are heightened; the formation of matter occasions rigors, frequent and irregular, until such a quantity is collected, as brings on delirium, spasm, and death."

Hitherto Mr. Pott has been describing this disease as unaccompanied by any other, not even by any external mark of injury, except perhaps a trifling bruise of the scalp; "Let us now, (says this eminent surgeon,) suppose the scalp to be wounded at the time of the accident, by whatever gave the contusion; or let us suppose, that the immediate symptoms having been alarming, a wound had been made, in order to examine the skull.

"In this case, the wound will for some little time have the same appearance as a mere simple wound of this part, unattended with other mischief, would have; it will, like that, at first discharge a thin sanies, or gleet, and then begin to suppurate; it will digest, begin to incarn, and look perfectly well; but, after a few days, all these favourable appearances will vanish; the sore will lose its florid complexion, and granulated surface; will become pale, glassy, and flabby; instead of good matter, it will discharge only a thin discoloured sanies; the lint with which it is dressed, instead of coming off easily (as in a kindly suppurating sore) will stick to all parts of it; and the pericranium, instead of adhering firmly to the bone, will separate from it, all round, to some distance from the edges.

"This alteration in the face and circumstances of the sore, is produced merely by the diseased state of the parts underneath the skull; which is a circumstance of great importance, in support of the doctrine advanced; and is demonstrably proved, by observing that this diseased aspect of the sore, and this spontaneous separation of the pericranium, are always confined to that part which covers the altered or injured portion of the dura mater, and do not at all affect the rest of the scalp; nay, if it has by accident been wounded in any other part, or a portion has been removed from any part where no injury has been done to the dura mater, no such separation will happen, the detachment above will always correspond to that below, and be found no where else.

"The first appearance of alteration in the wound immediately succeeds the febrile attack; and as the febrile symptoms increase, the sore becomes worse and worse, that is, degenerates more and more from a healthy, kindly aspect.

"Through the whole time, from the first attack of the fever, to the last and fatal period, an attentive observer will remark the gradual alteration of the colour of the bone, if it be bare. At first it will be found to be whiter, and more dry, than the natural one; and as the symptoms increase, and either matter is collected, or the dura mater becomes sloughy, the bone inclines more and more to a kind of purulent hue, or whitish yellow; and it may also be worth while in this place to remark, that if the blow was on or very near to a suture, and the subject young, the said suture will often separate in such a manner as to let through it a loose, painful, ill-natured fungus; at which time also it is no uncommon thing for the patient's head and face to be attacked with an erysipelas.

"In those cases, in which the scalp is very little injured by the bruise, and in which there is no wound, nor any immediate alarming symptoms or appearances, the patient feels little or no inconvenience, and seldom makes any complaint, until some few days are past. At the end of this uncertain time, he is generally attacked by the symptoms already recited; these are not pressing at first, but they soon increase to such a degree, as to baffle all our art: from whence it will appear, that when this is the case, the patient frequently suffers from what seems at first to indicate his safety, and prevents such attempts being made, and such care from being taken of them, as might prove preventive of mischief.

"But if the integuments are so injured as to excite or claim our early regard, very useful information may from thence be collected; for whether the scalp be

considerably bruised, or whether it be found necessary to divide it for the discharge of extravasated blood, or on account of worse appearances, or more urgent symptoms, the state of the pericranium may be thereby sooner and more certainly known: if in the place of such bruise, the pericranium be found spontaneously detached from the skull, having a quantity of discoloured sanies between them under the tumid part, in the manner already mentioned, it may be regarded as a pretty certain indication, either that the dura mater is beginning to separate in the same manner, or that if some preventive means be not immediately used, it will soon suffer; that is, it will inflame, separate from the skull, and give room for a collection of matter between them. And with regard to the wound itself, whether it was made at the time of the accident, or afterward artificially, it is the same thing; if the alteration of its appearance be as related, if the edges of it spontaneously quit their adhesion to the bone, and the febrile symptoms are at the same time making their attack, these circumstances will serve to convey the same information, and to prove the same thing.

"This particular effect of contusion is frequently found to attend on fissures, and undepressed fractures of the cranium, as well as on extravasations of fluid, in cases where the bone is entire; and, on the other hand, all these do often happen without the concurrence of this individual mischief. All this is matter of accident; but let the other circumstances be what they may, the spontaneous separation of the altered pericranium, in consequence of a severe blow, is almost always followed by a suppuration between the cranium and dura mater; a circumstance extremely well worth attending to in fissures and undepressed fractures of the skull, because it is from this circumstance principally, that the bad symptoms, and the hazard, in such cases arise.

"It is no very uncommon thing for a smart blow on the head to produce some immediate bad symptoms, which after a short space of time disappear, and leave the patient perfectly well. A slight pain in the head, a little acceleration of pulse, a vertigo and sickness, sometimes immediately follow such accident, but do not continue many hours, especially, if any evacuation has been used. These are not improbably owing to a slight commotion of the brain, which having suffered no material injury thereby, soon cease. But if, after an interval of some time, the same symptoms are renewed; if the patient, having been well, becomes again feverish, and restless, and that without any new cause; if he complains of being languid and uneasy, sleeps disturbedly, loses his appetite, has a hot skin, a hard quick pulse, and a flushed, heated countenance; and neither irregularity of diet, nor accidental cold, have been productive of these; mischief is most certainly impending, and that most probably under the skull.

"If the symptoms of pressure, such as stupidity, loss of sense, voluntary motion, &c. appear some few days after the head has suffered injury from external mischief, they do most probably imply an effusion of a fluid somewhere: this effusion may be in the substance of the brain, in its ventricles, between its membranes, or on the surface of the dura mater; and which of these is the real situation of such extravasation, is a matter of great uncertainty, none of them being attended with any peculiar mark or sign that can be depended upon, as pointing it out precisely; but the inflammation of the dura mater, and the formation of matter between it and the skull, in consequence of contusion, is generally indicated and preceded by one which Mr. Pott has hardly ever known to fail; a puffy, circumscribed, indolent tumour of the scalp, and a spontaneous separation of the pericranium from the skull under such tumour.

"These appearances, therefore, following a smart blow on the head, and attended with languor, pain, restlessness, watching, quick pulse, head-ach, and slight irregular shiverings, do almost infallibly indicate an inflamed dura mater, and pus, either forming or formed, between it and the cranium."

By detachment of the pericranium, is not meant every separation of it from the bone which it should cover. It may be, and often is cut, torn, or scraped off, without any such consequence; but these separations are violent, whereas that which Mr. Pott means is spontaneous, and is produced by the destruction of those vessels by which it was connected with the skull, and by which the communication between it and the internal parts was carried on; and therefore it is to be observed, that it is not the mere removal of that membrane which causes the bad symptoms, but it is the inflammation of the dura mater; of which inflammation, this spontaneous secession of the pericranium is an almost certain indication.

Sometimes the scalp is so wounded at the time of the accident, or so torn away, as to leave the bone perfectly bare; and yet the violence has not been such as to produce the evil just now spoken of. In this case, if the pericranium be only turned back, along with the detached portion of scalp, there may be probability of its reunion; and it should therefore be immediately made clean and replaced, for the

purpose of such experiment; which, if it succeeds, will save time, and prevent considerable deformity. Should the attempt fail, it can only be in consequence of the detached part sloughing. Hence, removing it with a knife, though allowed by Pott, is now never practised. Frequently, when the scalp does not adhere at once, it becomes attached to the cranium afterwards by a granulating process. When the detached piece sloughs, the worst that can happen, is an exfoliation from the bare skull.

Sometimes, the force which detaches, or removes the scalp, also occasions the mischief in question; but, the integuments being wounded or removed, we cannot have the criterion of the tumour of the scalp for the direction of our judgment. Our whole attention must be directed to the wound and general symptoms. The edges of the former will digest as well, and look as kindly, for a few days, as if no mischief was done underneath. But, after some little space of time, when the patient begins to be restless, and hot, and to complain of pain in the head, these edges will lose their vermilion hue, and become pale and flabby. Instead of matter, they will discharge a thin gleet, and the pericranium will loosen from the skull, to some distance from the said edges. Immediately after this, all the general symptoms are increased and exasperated; and as the inflammation of the membrane is heightened, or extended, they become daily worse and worse, until a quantity of matter is formed, and collected, and brings on that fatal period, which, though uncertain as to date, very seldom fails to arrive.

"The method of attempting the relief of this kind of injury consists in two points, viz. to endeavour to prevent the inflammation of the dura mater; or, that being neglected, or found impracticable, to give discharge to the fluid collected within the cranium, in consequence of such inflammation.

"Of all the remedies in the power of art, for inflammations of membranous parts, there is none equal to phlebotomy. To this truth many diseases bear testimony; pleurisies, ophthalmies, strangulated hernias, &c. and if any thing can particularly contribute to the prevention of the ills likely to follow severe contusions of the head, it is this kind of evacuation; but then it must be made use of in such a manner as to become truly a preventive; that is, it must be made use of immediately, and freely."

This eminent surgeon says, he is very sensible that it will in general be found very difficult to persuade a person, who has had what may be called only a knock on the pate, to submit to such discipline, especially if he finds himself tolerably well: yet, in many instances, the timely use, or the neglect of this single remedy, makes all the difference between safety and fatality.

"It may be said, that as the force of the blow, the height of the fall, the weight of the instrument, &c. can never precisely, or certainly determine the effect, nor inform us, whether mischief is done under the bone, or not, a large quantity of blood may be drawn off unnecessarily, in order to prevent an imaginary evil. This is in some degree true; and if the advice just given was universally followed, many people would be largely bled without necessity; but then, on the other hand, many a very valuable life would be preserved, which, for want of this kind of assistance, is lost. *Nihil interest, præsidium an satis tutum sit, quod unicum est*, is an incontested maxim in medicine; and if it be allowed to use such means as may be in themselves hazardous, surely it cannot be wrong to employ one which is not so; at least, if it be considered in a general sense, whatever it may accidentally prove to some few particular individuals."

Acceleration, or hardness of pulse, restlessness, anxiety, and any degree of fever, after a smart blow on the head, are always to be suspected and attended to. Immediate, plentiful, and repeated evacuations by bleeding, have, in many instances, removed these, in persons to whom, Mr. Pott verily believes, very terrible mischief would have happened, had not such precaution been used. In this, as well as some other parts of practice, we neither have, nor can have any other method of judging, than by comparing together cases apparently similar. Mr. Pott has more than once or twice seen that increased velocity and hardness of pulse, and that oppressive languor, which most frequently precede mischief under the bone, removed by free and repeated blood-letting; and has often, much too often, seen cases end fatally, whose beginnings were full as slight, but in which such evacuation had been either neglected, or not complied with. This judicious writer, "would by no means be thought to infer from hence, that early bleeding will always prove a certain preservative; and that they only die, to whom it has not been applied: this, like all other human means, is fallible; and, perhaps, there are more cases out of its reach, than within it: but, where preventive means can take place, this is certainly the best, and the most frequently successful.

"The second intention, viz. the discharge of matter, collected under the cranium, can be answered only by the perforation of it.

"When, from the symptoms and appearances already described, there is just reason for supposing matter to be formed under the skull, the operation of perforation cannot be performed too soon; it seldom happens, that it is done soon enough.

"The propriety, or impropriety, of applying the trephine, in cases where there is neither fissure, fracture, nor symptom of extravasation, is a point which has been much litigated, and remains still unsettled either by writers or practitioners.

"When there is no reason for suspecting any of those injuries, either from the symptoms, or from the appearances; and the pericranium, whether the scalp be wounded or not, remains firmly attached in all parts to the skull; there certainly is not (let the general symptoms be what they may) any indication where to apply the instrument, and consequently no sufficient authority for using it at all: but whenever that membrane, after the head has received an external violence, separates, or is detached spontaneously from the bone underneath it, and such separation is attended with the collection of a small quantity of thin, brown ichor, an alteration of colour in the separated pericranium, and an unnatural dryness of the bone, Mr. Pott cannot help thinking, that there is as good reason for trepanning, as in the case of fracture; he believes experience would vindicate him, if he said, better reason; since it is by no means infrequent for the former kind of case to do well without such operation; whereas suppuration under the skull never can.

"The spontaneous separation of the pericranium, if attended with general disorder of the patient with chillness, horripilatio, languor, and some degree of fever, appears to Mr. Pott, from all the observation he has been capable of making, to be so sure and certain an indication of mischief underneath, either in present, or impending, that he should never hesitate about perforating the bone in such circumstances.

"When the skull has been once perforated, and the dura mater thereby laid bare, the state of the matter must principally determine the surgeon's future conduct. In some cases, one opening will prove sufficient for all necessary purposes; in others, several may be necessary. This variation will depend on the space of detached dura mater and the quantity of collected matter. The repetition of the operation is warranted, both by the nature of the case, and by the best authorities; there being no comparison to be made between the possible inconvenience arising from largely denuding the dura matter, and the certain, as well as terrible evils which must follow the formation and confinement of matter between it and the skull.

"It can hardly be necessary to observe, that notwithstanding the operation of perforation be absolutely and unavoidably necessary, yet the repetition of blood letting or cooling laxative medicines, the use of antiphlogistic remedies, and a most strict observance of a low diet and regimen, are as indispensably requisite after such operation as before; the perforation sets the membrane free from pressure, and gives vent to collected matter, but nothing more; the inflamed state of the parts under the skull, and all the necessary consequences of such inflammation, call for all our attention, full as much afterwards as before; and although the patient must have perished without the use of the trephine, yet, the merely having used it, will not preserve him, without every other caution and care."

Both tables of the skull sometimes exfoliate in consequence of external violence. The dead bone must be removed, as soon as loose; and, if necessary, the scalp divided for the purpose.

3. *Fissures and Fractures of the Cranium, without Depression.*

"Fractures of the cranium, (says Mr. Pott) were, by the ancient writers, divided into many different sorts, each of which was distinguished by an appellation of Greek etymology, borrowed either from the figure of the fracture, or the disposition of the broken pieces. These are to be found in most of the old books; but as they merely load the memory, without informing the understanding, or assisting the practitioner, modern authors have generally laid them aside.

"This kind of injury is divisible into two general heads, viz. those in which the broken parts keep their proper level, or equality of surface, with the rest of the skull, and those in which they do not; or, in other words, fractures without depression, and fractures with.

"These two distinctions are all which are really necessary to be made, and will be found to comprehend every violent division of the parts of the skull (not made by a cutting-instrument) from the finest capillary fissure, up to the most complicated fracture: for, fissures and fractures differing from each other only in the width of the breach, or in the distance of the separated parts, and the disposition of broken pieces, in large fractures, being subject to an almost infinite variety, distinctions and appellations, drawn and made from these circumstances, might be multiplied to even three times the old

number without imparting the smallest degree of useful knowledge to the man, who should be at the pains to get them by heart.

"What are the symptoms of a fractured cranium? is often asked; and there is hardly any one who does not, from the authority of writers, both ancient and modern, answer, Vomiting, giddiness, loss of sense, speech, and voluntary motion, bleeding at the ears, nose, and mouth, &c. This is the doctrine of Celsus, which has been most invariably copied by almost all succeeding authors, and implicitly believed by almost all readers.

"The symptoms just mentioned do indeed very frequently accompany a broken skull, but they are not produced by the breach made in the bone; nor do they indicate such breach to have been made. They proceed from an affection of the brain, or from injury done to some of the parts within the cranium, independent of any ill which the bones composing it may have sustained. They are occasioned by violence offered to the contents of the head in general; are quite independent of the mere breach made in the bone; and either do or do not accompany fracture, as such fracture may happen to be, or not to be, complicated with such other ills.

"They are frequently produced by extravasations of blood, or serum, upon, or between the membranes of the brain; or by shocks, or concussions of its substance, in cases where the skull is perfectly intire and unhurt. On the other hand, the bones of the skull are sometimes cracked, broken, nay, even depressed, and the patient suffers none of these symptoms. In short, as the breach made in the bone is not, nor can be the cause of such complaints, they ought not to be attributed to it; and that for reasons, which are by no means merely speculative. For the practitioner, who supposes that such symptoms do necessarily and certainly imply that the cranium is fractured, must regulate his conduct by such supposition, and remove the scalp, very often without either necessity or benefit; that is, without discovering what he looks for: and, on the other hand, if he does find the skull to be broken, believing all these complaints to be caused by, and deducible from the fracture, he will most probably pay his whole attention to that supposed cause, and may think, that when he has done what the rules of his art prescribe for such case, he has done all that is in his power: — an opinion not unfrequently embraced; and which has been the destruction of many a patient. For, as on one hand, the loss of sense, speech, and voluntary motion, as well as the hemorrhage from the nose, ears, &c. are sometimes totally removed by, or at least disappear, during the use of free and frequent evacuation, without any operation on the scalp or skull; so, on the other, as these symptoms and appearances are not produced by the solution of continuity of the bone, they cannot be remedied by such chirurgic treatment as the mere fracture may require.

"If any one doubts the truth of this doctrine, (continues Mr. Pott,) I would desire him to consider the nature, as well as most generally successful method of treating these symptoms; and, at the same time, to reflect seriously on the operation of the trepan, as practised in simple, undepressed fractures of the skull.

"The sickness, giddiness, vomiting, and loss of sense and motion, can only be the consequence of an affection of the brain, as the common sensorium. They may be produced by its having been violently shaken, by a derangement of its medullary structure, or by unnatural pressure made by a fluid extravasated on its surface, or within its ventricles; but never can be caused by the mere division of the bone, (considered abstractedly); which division, in a simple fracture, can neither press on, nor derange, the structure of the parts within the cranium.

"If the solution of continuity in the bone be either produced by such a degree of violence, as hath caused a considerable disturbance in the medullary parts of the brain, or has disturbed any of the functions of the nerves going off from it; or has occasioned a breach of any vessel, or vessels whether sanguine or lymphatic, and that hath been followed by an extravasation, or lodgment of fluid; the symptoms necessarily consequent upon such derangement, or such pressure, will follow: but they do not follow, because the bone is broken; their causes are superadded to the fracture, and, although produced by the same external violence, are yet perfectly and absolutely independent of it: so much so, that they are frequently found where no fracture is.

"The operation of the trepan is frequently performed in the case of simple fractures, and that very judiciously and properly; but it is not performed, because the bone is broken, or cracked: a mere fracture, or fissure of the skull, can never require perforation, or that the dura mater under it be laid bare; the reason for doing this, springs from other causes than the fracture, and those really independent of it: they spring from the nature of the mischief which the parts within the cranium have sustained, and not from the accidental division of the bone. From these arise the threatening symptoms; from these all the hazard; and from these, the necessity, and vindi-

cation of performing the operation of the trepan.

"If a simple fracture of the cranium was unattended in present with any of the before-mentioned symptoms, and there was no reason for apprehending any other evil in future, that is, if the solution of continuity in the bone was the whole disease, it could not possibly indicate any other curative intention, but, the general one in all fractures, viz. union of the divided parts."

In many cases of simple undepressed fractures of the cranium, it is true, that trephining is necessary: but, the reasons for the operation, in these instances, are, first, the immediate relief of present symptoms arising from the pressure of extravasated fluid; and, secondly, the discharge of matter, formed between the skull and dura mater, in consequence of inflammation. The operation of trephining was also recommended by Pott, as a *preventive* of ill consequences; a practice, however, which is now never adopted by the most eminent surgeons; and many writers of the highest reputation, especially Desault, Dease, Mr. John Bell, and Mr. Abernethy, urgently, and properly remonstrate against the method.

The latter remarks: "In the accounts, which we have of the former practice in France, it is related, that surgeons made numerous perforations along the whole track of a fracture of the cranium; and, as far as I am able to judge, without any clear design. Mr. Pott also advises such an operation, with a view to prevent the inflammation and suppuration of the dura mater, which he so much apprehended. But, many cases have occurred of late, where, even in fractures with depression, the patients have done well without an operation."

Mr. Abernethy next relates several cases of fracture of the cranium with depression, which terminated favourably, although no operation was performed. This judicious surgeon thinks, that these cases, as well as a great many others on record, prove, that a slight degree of pressure does not derange the functions of the brain, for a limited time after its application: and all those, whom he had an opportunity of knowing for any length of time after the accident, continued as well as if nothing of the kind had happened to them. In Mr. Hill's cases in surgery, two instances of this sort are related, and Mr. Hill knew both the patients for many years afterwards; yet, no inconvenience arose. Indeed, it is not easy to conceive, that the pressure, which caused no ill effects at a time, when the contents of the cranium filled its cavity completely, should afterwards prove injurious, when they have adapted themselves to its altered size and shape. Severe illness, indeed, does often intervene between the receipt of the injury, and the time of its recovery; and many surgeons might be inclined to attribute this to pressure; but, it equally occurs when the depressed portion is elevated. If a surgeon, prepossessed with the opinion, that elevation of the bone is necessary in every instance of depressed cranium, should have acted upon this opinion in several of the cases, which Mr. Abernethy has related, and afterwards have employed proper evacuations, his patients would probably have had no bad symptoms, and he would naturally have attributed their well-doing to the mode of treatment, which he had pursued: yet, these cases did equally well without an operation. (*Abernethy on Injuries of the Head.*)

Depressed fractures of the skull not being our immediate consideration, we need not expatiate upon them; but, it seemed right to make the preceding remarks, in order to shew how unnecessary it must be to trephine a patient, merely because there is a fracture of the cranium, and with a view of *preventing* bad consequences. Even when the fracture is depressed, it is not necessary, unless there are evident signs, that the degree of pressure, thus produced on the brain, is the cause of existing bad symptoms.

The inflammation and suppuration of the parts, beneath the skull, which Mr. Pott wished so much to prevent by trephining early, do not arise from the occurrence of a breach in the cranium, but, are the consequences of the same violence, which was the occasion of the fracture. Hence, it is obvious, that removing a portion of the bone cannot in the least prevent the inflammation and suppuration, which must result from the external violence which was first applied to the head; but, on the contrary, such a removal being an additional violence, must have a tendency to increase the inevitable inflammatory mischief.

From what has been said, it is not to be inferred, however, that trephining is never proper, when there is a simple undepressed fracture of the skull. Such injury may be joined with an extravasation of blood on the dura mater; or, it may be followed by the formation of matter between this membrane and the cranium; in both which circumstances, the operation is essential to the preservation of the patient, immediately, but not before, the symptoms indicative of the existence of dangerous pressure on the brain, begin to shew themselves. (See *Trephine.*)

A fracture of the skull, unattended

with urgent symptoms, and not brought into the surgeon's view by any accidental wound of the integuments, often remains for ever undiscovered; and as no benefit could arise from laying it bare by an incision, such practice should never be adopted. The surgeon ought only to be officious in this way, when he can accomplish by it some better object, than the merely satisfying his own curiosity. And as we shall find from the perusal of this article, and the one intitled, *Trephine*, that the removal of pressure off the surface of the brain is the only possible reason for ever perforating the cranium with this instrument; and as dividing the scalp is only a useful measure, when it is preparatory to such operation; neither the one, nor the other, should ever be practised, unless there exist unequivocal symptoms, that there is a dangerous degree of pressure operating on the brain, and caused either by matter, extravasated blood, or a depressed portion of the skull.

The true mode of *preventing* the bad effects, frequently following, but not arising from, simple fractures of the skull, is not to trephine, but, to put in practice all kinds of antiphlogistic means. For this purpose, let the patient be repeatedly and copiously bled, both from the arm and temporal arteries; let him be properly purged; give him antimonials; keep him on the lowest diet; let him remain in the most quiet situation possible; and if, notwithstanding such steps, the symptoms of inflammation of the brain continue to increase, let his head be shaved, and a large blister be applied to it. When, in spite of all these measures, matter forms under the cranium, attended with symptoms of pressure, a puffy tumour of the injured part of the scalp, or those changes of the wound, if there is one, which Mr. Pott has so excellently described, and we have already related; not a moment should be lost in delaying to perforate the bone with the trephine, and giving vent to the matter beneath.

4. *Fractures of the Cranium with Depression.*

"Simple fractures of the skull, or those in which the parts of the broken bone are not depressed from their situation (observes Mr. Pott) differ from what are called fissures, only in the distance of the edges of the breach from each other. When the separation is considerable, it is called a fracture; when it is very fine and small, it is called a fissure. The chirurgical intention, and requisite treatment, are the same in each, viz. to procure a discharge for any fluid which may be extravasated in present, (*here we must understand supposing the pressure of such extravasation produces urgent symptoms*) and to guard against the formation, or confinement of matter. The prevention of suppuration will, as we have already remarked, be best accomplished, not by perforating the cranium, as Mr. Pott advised, but by copious bleeding, evacuations, blisters, and a rigorous antiphlogistic regimen. The confinement of matter, producing symptoms of pressure on the brain certainly indicates the immediate use of the trephine.

"But, in fractures, attended with depression, (says Pott) the intentions are more. In these the depressed parts are to be elevated, and such as are so separated as to be incapable of reunion, or of being brought to lie properly, and without pressing on the brain, are to be totally removed. These circumstances are peculiar to a depressed fracture; but, although they are peculiar, they must not be considered as sole, but, as additional to those, which have been mentioned at large under the head of simple fracture: commotion, extravasation, inflammation, suppuration, and every ill, which can attend on, or be found in the latter, are to be met with in the former, and will require the same method of treatment." That loose splintered pieces of the cranium, when quite detached, and already in view, in consequence of the scalp being wounded, ought to be taken away, no one will be inclined to question. That they ought also to be exposed by an incision, even when the scalp is unwounded, and then taken away, whenever they cause symptoms of irritation, or pressure, I believe, will be universally allowed. But, the reader will already understand, from what has been said, in the preceding section, that several excellent surgeons do not coincide with Pott, in believing, that every depressed fracture of the skull necessarily demands the application of the trephine.

"There certainly are (says Mr. Abernethy) degrees of this injury, which it would be highly imprudent to treat in this manner. Whenever the patient retains his senses perfectly, I should think it improper to trephine him, unless symptoms arose, that indicated the necessity of it." P. 21.

Every surgeon, indeed, cannot be too fully impressed with the following truth, that existing symptoms of dangerous pressure on the brain, which symptoms will be presently related, can alone form a true reason for perforating the cranium. The mode of operating, in order to elevate depressed portions of the skull, is explained in the article, *Trephine*.

5. *Extravasation under the Cranium; Symptoms of Pressure on the Brain, &c.*

Mr. Pott remarks, "the shock, which

the head sometimes receives by falls from on high, or by strokes from ponderous bodies, does not infrequently cause a breach in some of the vessels, either of the brain, or its meninges; and, thereby, occasions extravasation of the fluid, which should circulate through them. This extravasation may be the only complaint produced by the accident; or it may be joined with, or added to, a fracture of the skull. But this is not all, for it may be produced not only when the cranium is unhurt by the blow, but even when no violence of any kind has been offered to, or received by the head."

When blood is extravasated beneath the skull, the violence which produces the rupture of the vessel, usually stuns the patient, from which state, provided the quantity and pressure of the blood, and the force of the concussion be not too great, he gradually recovers, and regains his senses. If the first extravasation be trivial, the patient, after regaining his senses, may only feel a little drowsiness, and go to bed. The bleeding from the ruptured vessel continuing, and the pressure on the brain increasing, he becomes more and more insensible, and begins to breathe in a slow, interrupted, stertorous manner. In cases of compression, whether from blood or a depressed portion of the skull, there is a general insensibility, the eyes are half open, the pupil dilated, and motionless even when a candle is brought near the eye; the retina is insensible; the limbs relaxed; the breathing stertorous; the pulse slow, and, according to Mr. Abernethy, less subject to intermission, than in cases of concussion. Nor is the patient ever sick, when the pressure on the brain and the general insensibility, are considerable; for, the very action of vomiting betrays an irritability in the stomach and œsophagus. These symptoms are not peculiar to pressure from blood, but arise also from that of many depressed fractures of the skull, and of suppuration under this part. They are all attributable to the unnatural pressure made on the brain and nerves, and have too often been mistaken, as indications of a disease, which, considered abstractly, can never cause them; we allude to a simple undepressed fracture of the cranium, which may be accompanied by them, but cannot cause them. They differ in degree, according to the quantity, kind, and situation of the pressing fluid. The hemorrhage from the nose and ears, which often follows violence applied to the head, leads to no particular or useful inference: we cannot even calculate, by this sign, that the force has exceeded a certain degree; for, such bleedings take place, in many persons, from much slighter causes than in others.

The preceding class of symptoms only inform us, that the brain is suffering compression; and, leaves us quite in the dark, respecting several other very important circumstances. "We not only have no certain infallible rule, whereby to distinguish, what the pressing fluid is, or where it is situated, but we are, in many instances absolutely incapable of knowing, whether the symptoms be occasioned by any fluid at all; for, a fragment of bone, broken off from the internal table of the cranium, and making an equal degree of pressure, will produce exactly the same complaints." (*Pott.*) In detailing the symptoms of pressure from blood, I took particular notice of the patient being at first generally stunned by the blow; of his gradually regaining his senses, and of his afterwards relapsing into a state of insensibility again. *The interval of sense*, which thus occurs, is a circumstance, of the greatest consequence in making the surgeon understand the nature of the case.

"A concussion, and an extravasation (as Mr. Pott observes) are very distinct causes of mischief, though not always very distinguishable.

"M. Le Dran, and others of the modern French writers, have made a very sensible and just distinction between that kind and degree of loss of sense which arises from a mere commotion of the brain, and that which is caused by a mere extravasation, in those instances in which the time of the attack or appearance of such symptoms are different or distinct. The loss of sense, which immediately follows the violence, say they, is most probably owing to a commotion; but that which comes on after an interval of time has past, is most probably caused by extravasation.

"This distinction is certainly just and good, as far as it will go. That degree of abolition or diminution of sense, which immediately attends or follows the blow or fall, and goes off again without the assistance of art, is in all probability occasioned by the sudden shake or temporary derangement of the contents of the head; and the same kind of symptoms recurring again some time after they had ceased, or not coming on until some time has passed from the receipt of the violence, do most probably proceed from the breach of a vessel within or upon the brain. But unluckily, we have it not very often in our power to make this exact distinction. An extravasation is often made so immediately, and so largely, at the instant of the accident, that all sense and motion are instantaneously lost, and never again return. And it also sometimes happens, that although an extravasation may possibly

not have been made at the moment of the accident, and the first complaints may have been owing to commotion merely, yet a quantity of fluid having been shed from its proper vessels very soon after the accident, and producing its proper symptoms, before those caused by the commotion have had time to go off, the similarity of the effects of each of these different causes is such, as to deprive us of all power of distinguishing between the one and the other, or of determining with any tolerable precision to which of them such symptoms as remain are really owing.

"When an extravasation of any kind is made, either upon or within the brain, if it be in such quantity, or so situated, as to disorder the œconomy of the animal, it always produces such disorder, by making an unnatural pressure on the parts where it lies. The nature and degree of the symptoms hereby produced are various and different in different persons, according to the kind, quantity, and situation of the pressing fluid. Sometimes it is mere fluid blood, sometimes blood in a state of coagulation, sometimes it is a clear lymph, and at others blood and water are found mixed together; each of these is found either simple or mixed in different situations, that is, between the skull and dura mater, between the dura and pia mater, or in the natural cavities of the brain called its ventricles, and sometimes, in cases of great violence, they are found at the same time in all these different parts. Sometimes a considerable quantity is shed instantly, at the time of the accident; and sometimes the breach by which the effusion is made is so circumstanced, both as to nature and situation, that it is at first very small, and increases by faster or slower degrees. In the former, the symptoms are generally immediate and urgent, and the extravasation is of the bloody kind; in the latter, they are frequently slight at first, appear after some little interval of time, increase gradually till they become urgent or fatal, and are in such case, generally occasioned by extravasated lymph. So that although the immediate appearance of bad symptoms does most certainly imply mischief of some kind or other, yet, on the other hand, no man ought to suppose his patient free from hazard, either because such symptoms do not shew themselves at first, or because they appear to be but slight: those which come on late, or appearing slight at first, increase gradually, being full as much to be dreaded as to consequence, as the more immediately alarming ones; with this material difference between them, that the one *may* be the consequence of a mere concussion of the brain, and may by means of quietude and evacuation go quite off; whereas, the other being most frequently owing to an extravasation of lymph, (though sometimes of blood also) within the substance of the brain, are very seldom removed by art." (*Pott.*)

The case of extravasation, between the cranium and dura mater, is almost the only one, which admits of relief from trephining. Mr. Abernethy informs us, that, in the cases, which he has seen, of blood extravasated, between the dura and pia mater, on a division of the former membrane being made for its discharge, only the serous part of it could be evacuated: for, the coagulum was spread over the hemisphere of the brain, and had descended, as low as possible, towards its inferior part, so that very little relief was obtained by the operation. (*P.* 32.)

Fractures of the cranium, which take place across the lower and front angle of the parietal bone, and the rest of the track of the trunk, and large branches of the spinous artery of the dura mater, are cases very apt to be attended with a copious extravasation. This vessel, and others more deeply seated, however, may be ruptured, pour out a considerable quantity of blood, and induce urgent symptoms of pressure on the brain, not only without the co-existence of a fracture, but even of any external mark of violence on the scalp.

The effused blood is, more frequently, situated below the part, on which the violence has operated, and, hence, when such part is pointed out by a wound, or discolouration of the scalp, and the symptoms of pressure are considerable, there cannot be two opinions, respecting the propriety of immediately trephining, and the place, where to make the perforation. But, what is to be done, when dangerous symptoms of pressure prevail, without any external mark to denote, what part of the head received the blow, or whether any at all; for, a general concussion of the head may produce an effusion of blood within the cranium. Under these circumstances, Mr. Pott was against the operation, and says that "the only chance of relief is from phlebotomy, and an open belly; by which we may hope so to lessen the quantity of the circulating fluids as to assist nature in the dissipation or absorption of what has been extravasated. This is an effect which, although not highly improbable in itself, yet is not to be expected from a slight or trifling application of the means proposed. The use of them must be proportioned to the hazard of the case. Blood must be drawn off freely and repeatedly, and from different veins; the belly must be kept constantly open, the body quiet, and the strictest re-

gularity of general regimen must be rigidly observed. By these means, very alarming symptoms have now and then been removed, and people in seemingly very hazardous circumstances have been recovered."

If the symptoms, however, were urgent, it certainly might be proper to perforate the cranium in the course of the spinous artery of the dura mater. If no blood should be found under one parietal bone: the operation might be done on the other. This situation, we know, is the chief one for copious extravasations between the cranium and dura mater, and, if the blood be more deeply effused, we have the consolation of knowing, that the patient had the chance of that benefit, which might have resulted from the operation, had the pressure originated from an extravasation in one of the most common places, between the dura mater and the skull.

This part of practice, however, is exceedingly doubtful and obscure. But, should the mode of judging, whether blood lies immediately under the skull, suggested by Mr. Abernethy, prove, invariably correct, our line of conduct may be hereafter more easily determined, respecting whether the trephine should be applied in such dubious cases, or not. Even when the injured scalp shews where the violence has operated, the criterion, we are about to notice, may inform us, whether we should perforate the bone, or not; for, though the extravasation is sometimes found immediately under the external mark, yet, it often is not so; but, is in a part distant from that mark, to which we have nothing to lead us, and to which, indeed, if we knew it, we could not reach. Mr. Abernethy has observed, "that unless one of the large arteries of the dura mater be wounded, the quantity of blood, poured out, will probably be inconsiderable; and the slight compression of the brain, which this occasions, may not be attended with any peculiar symptoms, or perhaps, it may occasion, some stupor, or excite an irritation, disposing the subjacent parts to become inflamed. It is indeed highly probable, that, in many cases, which have done well without an operation, such an extravasation has existed. But, if there be so much blood on the dura mater, as materially to derange the functions of the brain, the bone, to a certain extent, will no longer receive blood from within, and by the operation, performed for its exposure, the pericranium must have been separated from its outside. I believe, that *a bone, so circumstanced, will not be found to bleed.*" In some cases, related by this gentleman, there was no hemorrhage; twice he was able, by attending to this circumstance, to tell how far the detachment of the dura mater extended; and often, when symptoms seemed to demand a perforation of the skull; he has seen the operation contra-indicated by the hemorrhage from the bone, and as the event shewed, with accuracy. (*P.* 33.)

Pott justly remarks, that "if the extravasation be of blood, and that blood be in a fluid state, small in quantity, and lying between the skull and dura mater, immediately under or near to the place perforated, it may happily be all discharged by such perforation, and the patient's life may thereby be saved; of which many instances are producible. But if the event does not prove so fortunate, if the extravasation be so large or so situated that the operation proves insufficient, yet the symptoms having been urgent, general evacuation having been used ineffectually, and a wound or bruise of the scalp having pointed out the part which most probably received the blow: although the removal of that part of the scalp should not detect any injury done to the bone, yet the symptoms still subsisting, I cannot help thinking, that perforation of the cranium is in these circumstances so fully warranted, that the omission of it may truly be called a neglect of having done that which might have proved serviceable, and, *rebus sic stantibus*, can do no harm. It is very true, that no man can beforehand tell whether such operation will prove beneficial or not, because he cannot know the precise nature, degree, or situation of the mischief; but, this uncertainty properly considered, is so far from being a dissuasive from the attempt, that it is really a strong incitement to make it; it being fully as impossible to know, that the extravasated fluid does *not* lie between the skull and dura mater, and that under the part stricken, as that it *does;* and if the latter should be the case, and the operation be not performed, one, and most probably the only means of relief, will have been omitted."

When there is no interval of sense, between the blow, and the coming on of perilous symptoms, it is frequently impossible to determine, whether the mischief be owing to the largeness and suddenness of the extravasation, to the violence of the shock, which the brain has received, or to both these causes at once, which, unfortunately, is too often the case. In this latter complication, indeed, trephining will frequently be of no avail, even though it serve for the entire removal of all pressure off the brain; for, the patient cannot recover from the violence of the concussion, and never regains his senses. This is no reason, however, why the chance of the operation doing good should not be taken, when there are evident symptoms of pressure. Let us in these darkened

cases, call to mind the sentiments of Pott, who says: "No man, who is at all acquainted with this subject, will ever venture to pronounce or promise success from the use of the trephine, even in the most apparently slight cases; he knows that honestly he cannot; it is enough that it has often been successful where and when every other means have failed. The true and just consideration is this: does the operation of perforating the cranium in such case add at all to that degree of hazard which the patient is in before it is performed? or can he in many instances do well without it? If it does add to the patient's hazard, that is certainly a very good reason for laying it aside, or for using it very cautiously; but, if it does not, and the only objection made to it, is, that it frequently fails of being successful, surely it cannot be right to disuse that, which has often been, not only salutary, but the *causa sine quâ non* of preservation, merely, because it is also often unsuccessful, that is, because it is not infallible."

Mr. Pott thought, that, whenever the dura was detached from the inner surface of the skull by blood, as well as matter, the pericranium covering the outer part of the same bone would generally become detached also, and this spontaneous separation of the latter membrane he very justly regards, as a positive indication for the operation. However, it is very certain, that if, in cases of extravasation, the surgeon were to wait for this criterion, the operation would be done too late, and, therefore, whenever unequivocal symptoms of pressure on the brain exist, trephining should never be delayed. Giving vent to the confined blood "may produce a cure, or it may prove only a temporary relief, according to the different circumstances of different cases. The disappearance, and even the alleviation of the most pressing symptoms is undoubtedly a favourable circumstance, but is not to be depended upon as absolutely portending a good event. Either a bloody, or limpid extravasation may be formed, or forming between the meninges, or upon, or within the brain, and may prove as certainly pernicious in future, as the more external effusion would have done, had it not been discharged; or the dura mater may have been so damaged by the violence of the blow as to inflame and suppurate, and thereby destroy the patient." (*Pott.*)

"If the disease (says the same eminent surgeon) lies between the dura and pia mater, mere perforation of the skull can do nothing; and, therefore, if the symptoms are pressing, there is no remedy but division of the outer of these membranes. The division of the dura mater is an operation, which I have several times seen done by others, and have often done myself; I have seen it, and found it now and then successful; and, from those instances of success, am satisfied of the propriety, and necessity of its being sometimes done." He next states, however, his sentiment, that wounding the dura mater is itself attended with dangerous consequences. Mr. Abernethy's opinion of such operation has already been given.

"Upon the removal of a piece of bone by means of the trephine; if the operation has been performed over the part where the disease is situated, and the extravasation be of the fluid kind, and between the cranium and dura mater; such fluid, whether it be blood, water, or both, is immediately seen, and is partly discharged by such opening; if, on the other hand, the extravasation be of blood in a coagulated or grumous state, it is either loose, or in some degree adherent to the dura mater; if the former of these be the case, it is either totally or partially discharged at the time of, or soon after, the operation, according to the quantity or extent of the mischief; if the latter, the perforation discovers, but does not immediately discharge it. In both instances, the conduct of the surgeon, with regard to repetition of the operation, must be determined by the particular circumstances of each individual case; a large extravasation must necessarily require a more free removal of bone than a small one; not only on account of freedom of discharge, but on account of larger detachment of dura mater; and a grumous or coagulated extravasation requires a still more free use of the instrument, not only because the blood in such state is discharged with difficulty, but because the whole surface of the dura mater so covered is always put under the necessity of suppurating, which suppuration has but one chance of a happy event, and that derivable from the free use of the perforator.

"When the extravasation is not between the cranium and dura mater, but either between the meninges, or in the ventricles of the brain, the appearances are not only different from the preceding state of the case, but from each other.

"When the extravasated fluid lies between the skull and dura mater; as soon as that extravasation is discharged, or the grumous blood has been wiped off, the dura mater appears flaccid, easily yields to or does not resist the impression of a finger, and (the discharge being made) enjoys that kind of motion, that elevation and depression, which our fathers supposed it to have naturally and always, but which is only the consequence of the circulation through the brain, and the

artificial removal of the piece of bone. But when the extravasation is situated between the meninges, or on the surface of the brain, the appearance is not the same. In this case, there is no discharge upon removing the bone; and the dura mater, instead of being flaccid and readily obeying the motion of the blood, appears full and turgid, has little or no motion, and pressing hard against the edges of the perforation, rises into a kind of spheroidal form in the hole of the perforated bone. If the extravasation be of the limpid kind, the membrane retains its natural colour; but if it be either purely fluid blood, or blood coagulated, and the subject young, the colour of the membrane is so altered by what lies under it, that the nature of the case is always determinable from this circumstance.

"Be the extravasated fluid what it may, it has no natural outlet; absorption was the only chance the patient had whereby to get rid of it without an operation, and that we must now suppose to have failed; an artificial opening therefore must be made, by the division of the dura mater, and perhaps of the pia also. This operation, under the circumstances and appearances already mentioned, is absolutely necessary, and has been successful; it is performed to give discharge to what cannot be got rid of by any other means, and consists in a division of the membrane or membranes, made in a crucial form with a point of a lancet. The operation in itself is extremely simple and easy, but the patient is thereby put into the state of one whose meninges have been wounded, with only this difference, that the wound made for this purpose is smooth and simple, and inflicted with the least possible violence: whereas an accidental wound of the same parts may be lacerated, contused, and attended with circumstances which must aggravate the evil, and may induce worse consequences." (*Pott.*)

All cases of pressure on the brain are attended with hazard of inflammation of this organ, and membranes. This danger must be averted as much as possible, by the antiphlogistic means, recommended in speaking of fractures of the skull.

CONCUSSION, OR COMMOTION OF THE BRAIN.

"Very alarming symptoms, followed sometimes by the most fatal consequences, (Pott remarks,) are found to attend great violence offered to the head; and, upon the strictest examination both of the living and the dead, neither fissure, fracture, nor extravasation of any kind can be discovered. The same symptoms, and the same event, are met with, when the head has received no injury at all *ab externo*, but has only been violently shaken; nay, when only the body, or general frame, has seemed to have sustained the whole violence." And the same writer afterwards accurately observes, that "the symptoms attending a concussion are generally in proportion to the degree of violence, which the brain itself has sustained, and which, indeed, is cognizable only by the symptoms. If the concussion be very great, all sense and power of motion are immediately abolished, and death follows soon: but, between this degree, and that slight confusion (or stunning, as it is called) which attends most violences, done to the head, there are many stages." I think Mr. Abernethy has particularly excelled other writers, in his description of the symptoms of concussion, which, he is of opinion, may be properly divided into three stages.

"The *first* is, that state of insensibility and derangement of the bodily powers, which immediately succeeds the accident. While it lasts, the patient scarcely feels any injury that may be inflicted on him. His breathing is difficult, but in general without stertor; his pulse intermitting, and his extremities cold. But such a state cannot last long; it goes off gradually, and is succeeded by another, which I consider as the *second* stage of concussion. In this, the pulse and respiration become better, and, though not regularly performed, are sufficient to maintain life, and to diffuse warmth over the extreme parts of the body. The feeling of the patient is now so far restored, that he is sensible if his skin be pinched; but he lies stupid, and inattentive to slight external impressions. As the effects of concussion diminish, he becomes capable of replying to questions put to him in a loud tone of voice, especially when they refer to his chief suffering at the time, as pain in the head, &c.; otherwise, he answers incoherently, and as if his attention was occupied by something else. As long as the stupor remains, the inflammation of the brain seems to be moderate; but as the former abates, the latter seldom fails to increase; and this constitutes the *third* stage, which is the most important of the series of effects proceeding from concussion.

"These several stages vary considerably in their degree and duration; but more or less of each will be found to take place in every instance where the brain has been violently shaken. Whether they bear any certain proportion to each other or not, I do not know. Indeed this will depend upon such a variety of circumstances in the constitution, the injury, and the after-treatment, that it must be difficult to determine.

"With regard to the treatment of concussion, it would appear, that in the first stage very little can be done; and perhaps, what little is done, had better be omitted, as the brain and nerves are probably insensible to any stimulants that can be employed. From a loose, and, I think, fallacious analogy between the insensibility in fainting, and that which occurs in concussion, the more powerful stimulants, such as wine, brandy, and volatile alkali, are commonly had recourse to, as soon as the patient can be got to swallow. The same reasoning which led to the employment of these remedies in the *first* stage, in order to recall sensibility, has given a kind of sanction to their repetition in the *second*, with a view to continue and increase it.

"But here the practice becomes more pernicious, and less defensible. The circumstance of the brain having so far recovered its powers, as to carry on the animal functions in a degree sufficient to maintain life, is surely a strong argument that it will continue to do so, without the aid of means which probably tend to exhaust parts already weakened, by the violent action they induce.

"And it seems probable, that these stimulating liquors will aggravate that inflammation which must sooner or later ensue." (*Essay on Injuries of the Head, p.* 59.)

The following passage, extracted from a writer, who has already been of material assistance to us in this subject, cannot be too deeply impressed on the memory of every surgical practitioner:

"To distinguish between an extravasation and a commotion, by the symptoms only, is frequently a very difficult matter, sometimes an impossible one. The similarity of the effects in some cases, and the very small space of time which may intervene between the going off of the one and accession of the other, render this a very nice exercise of the judgment. The first stunning or deprivation of sense, whether total or partial, may be from either, and no man can tell from which; but when these first symptoms have been removed, or have spontaneously disappeared; if such patient is again oppressed with drowsiness, or stupidity, or total or partial loss of sense, it then becomes most probable, that the first complaints were from commotion, and that the latter are from extravasation; and the greater the distance of time between the two, the greater is the probability not only that an extravasation is the cause, but that the extravasation is of the limpid kind, made gradatim, and within the brain.

"Whoever seriously reflects on the nature of these two causes of evil within the cranium, and considers them as liable to frequent combination in the same subject, and at the same time considers, that in many instances no degree of information can be obtained from the only person capable of giving it (the patient), will immediately be sensible, how very difficult a part a practitioner has to act in many of these cases, and how very unjust it must be to call that ignorance, which is only a just diffidence arising from the obscurity of the subject, and the impossibility of attaining materials to form a clear judgment.

"When there is no reason to apprehend any other injury, and commotion seems to be the sole disease, plentiful evacuation by phlebotomy and lenient cathartics, a dark room, the most perfect quietude, and a very low regimen, are the only means in our power; and are sometimes successful." (*Pott.*)

The reader, who wishes to acquire the most accurate information, concerning injuries of the head, may consult, with advantage, various dissertations in the *Mem. de l'Acad. de Chirurgie; Traité des Opérations de Chirurgie par Le Dran; Dease on Wounds of the Head; Pott on Injuries of the Head from External Violence; Hill's Cases in Surgery; O'Halloran on the different Disorders arising from External Injuries of the Head; Some Cases in Desault's Parisian Chirurgical Journal; Mémoire sur les Plaies de Tête, in Œuvres Chirurgicales de Desault, par Bichat, Tom.* 2; *Lassus, Pathologie Chirurgicale, Tom.* 2, *p.* 252, *&c. Edit.* 1809.

HECTIC FEVER. See *Fevers, Surgical.*

HEMERALOPIA. According to M. Dujardin, this term is derived from ἡμέρα, the day, ἄλως, blind, and ὤψ, the eye, and its right signification is therefore inferred to be *diurna cæcitudo*, or *day-blindness.* (See *Journal de Médecine, Tom.* 19, *p.* 348.) In the same sense, Dr. Hillary (*Obs. on the Diseases of Barbadoes, p.* 298, *Edit.* 2.), Dr. Heberden (*Med. Transactions, Vol.* 1, *Art.* 5.) have employed the term.

Hemeralopia then, which is of very rare occurrence, stands in opposition to the *nyctalopia*, of the ancients, or *night-blindness.* Modern writers in general, however, have used these terms in the contrary sense; considering the hemeralopia, as denoting sight during the day, and blindness in the night, and nyctalopia, as expressing night-seeing, owl-sight, as the French call it, and blindness during the day-time.

Hemeralopia, in the meaning of day-blindness, is a very uncommon affection. Dr. Hillary had never met with but two examples. He mentions a report, however, that there are a people in Siam, in the East Indies, and also in Africa, who are subject to the disease of being blind

in the day time, and seeing well by night. (*Mod. Univ. Hist. Vol.* 7.)

Sauvages affirms, that the hemeralopia, in his nomenclature called amblyopia crepuscularis, had, about two years before, been in some degree epidemic in the neighbourhood of Montpellier, in the villages, in damp situations adjoining the rivers, and that it particularly affected the soldiers, who slept in the open damp air. They were cured, he says, by blistering, together with emetics and cathartics, and other evacuants. (*Nosol. Method. Class* 6, *Gen.* 3, *Spec.* 1.)

See some ingenious observations on this subject in Dr. Rees's Cyclopædia, Art. Hemeralopia.

Scarpa, with the generality of modern writers, has considered the hemeralopia, as an affection, in which the patient sees very well in the day, but, not in the night-time.

The following observations are offered by this celebrated Professor upon the disease, in the sense of night-blindness.

"*Hemeralopia*, or *nocturnal blindness*, (says Scarpa) is properly nothing but a kind of imperfect periodical amaurosis, most commonly sympathetic with the stomach. Its paroxysms come on towards the evening, and disappear in the morning. The disease is endemic in some countries, and epidemic, at certain seasons of the year, in others.

"At sunset, objects appear to persons affected with the complaint, as if covered with an ash-coloured veil, which gradually changes into a dense cloud, which intervenes between the eyes, and surrounding objects. Patients with hemeralopia have the pupil, both in the day and night-time, more dilated, and less moveable, than it usually is in healthy eyes. The majority of them, however, have the pupil more or less moveable in the day-time, and always expanded and motionless at night. When brought into a room faintly lighted by a candle, where all the by-standers can see tolerably well, they cannot discern at all, or in a very feeble manner, scarcely any one object; or they only find themselves able to distinguish light from darkness; and at moon-light their sight is still worse. At day-break they recover their sight, which continues perfect, all the rest of the day, till sunset."

This disease (according to Scarpa) may commonly be completely cured, and oftentimes in a very short time, by treating it on the same plan by which the imperfect amaurosis is remedied; (see *Amaurosis*;) viz. by employing emetics, the resolvent powders, and pills, and a blister on the nape of the neck; and, topically, the vapours of the caustic volatile alkali: lastly, by prescribing, towards the end of the treatment, bark conjoined with valerian. In cases, in which the disease has been preceded by plethora, and suppressed perspiration, bleeding and sudorifics are also indicated.

In this manner, Scarpa has succeeded in curing three subjects, affected with the complaint. The first was a boy, fourteen years old, who, for several weeks, had, in vain, made use of the fumigation of a sheep's liver, which had been fried. The second was a waterman; the third a countryman, living in the rice-fields in the vicinity of Pavia. The two last were between thirty and forty years of age, and emaciated, with bloated, sallow countenances. After the boy had vomited a good deal, in consequence of taking, at repeated doses, in the space of two hours, a grain and a half of tartar emetic, dissolved in four ounces of water, he took on the following days, the resolvent powders, mentioned in *Amaurosis*. They produced nausea, and two or three copious stools, regularly every day. On the evening of the fifth day, the patient began to discern surrounding objects by the faintest light of a lantern. Even since the emetic was administered, he continued the topical use of the vapours of the spirit of sal-ammoniac, and, on the sixteenth day, was perfectly cured. The waterman thrice vomited up a considerable quantity of a yellowish, viscid matter. Afterwards, he took the resolvent powders, which made him vomit again on the third day, and, in the day-time, he regularly exposed his eyes, every four hours, to the action of the ammoniacal vapours. It was not till the eleventh day, that he began to distinguish objects in the night-time by a weak candle-light. The countryman vomited only once copiously, but afterwards experienced considerable nausea during the nine following days, on which he took the resolvent powders, and he daily discharged by stool a considerable quantity of greenish matter. From the beginning, this patient also employed the ammoniacal vapours, as a topical application, and, on the evening of the fourteenth day, he began to see by candle-light. From this period, he continued to regain the faculty of seeing objects in the night-time regularly more and more, until he was completely cured. Towards the conclusion of the treatment, Scarpa gave these patients bark and valerian.

But, the most expeditious cure was that which Scarpa effected on Mauro Bonini, a robust husbandman, of Donalasco, aged two-and-twenty. This man began in March to perceive, that, at sunset, he could only distinguish objects very imperfectly. The complaint increased to such a degree, that, in the beginning of May, he was almost totally blind in the

evening. On the tenth of May, he came to the hospital at Pavia. Having examined both his eyes in the day-light, Scarpa found both the pupils very much dilated, and almost motionless. In the evening, he repeated the examination, and assured himself, that the patient could not see objects, which were visible to the by-standers, consequently, that he was affected with hemeralopia. He also complained of bitterness in his mouth, heaviness in his head, and his tongue was foul.

On the eleventh, Scarpa ordered him an emetic, which did not produce so much effect as was expected, and therefore a stronger one was prescribed the next day. It was composed of a dram and a half of ipecacuanha, and two grains of tartar emetic. This dose made him vomit up a considerable quantity of yellow, greenish matter. The patient found his head relieved immediately afterwards, and the bitterness in his mouth was no longer perceptible; the pupils of his eyes contracted a little, and became somewhat moveable in a vivid light. The ammoniacal vapours were now externally applied. The same evening, the patient's sight seemed amended, and, on the thirteenth, all internal medicines were discontinued, the vapours alone being used.

On the fourteenth, the patient complained again of bitterness in his mouth, and his tongue appeared furred. Scarpa ordered him to take the resolvent powders every three hours. These produced nausea, and some evacuations from the bowels. The use of the vapours was continued. In the evening, Scarpa exposed the patient to the same degree of light, as when the preceding examinations were made, and the patient was able to distinguish all objects which were presented to him, exceedingly well. On the sixteenth, the symptoms of foulness in the stomach entirely disappeared, and the pupil of each eye contracted in a moderate light, as in healthy persons. The man left the hospital, on the seventeenth, perfectly cured.

Scarpa notices, that the ancients have strongly recommended, for the cure of this disease, the fumigations of a sheep's liver fried. These were directed against the eyes through a funnel; and the liver, thus prepared, was also directed to be eaten. Even in Italy, according to Scarpa, this remedy in general obtains confidence, not only with the vulgar, but also with surgeons. Some writers add, that it is productive of wonderful success among the Chinese, who are said to be very liable to this complaint. Scarpa says, he has no observation of his own to offer in support of this account; but, the case of the above-mentioned boy seems to be repugnant to it. If, however, the efficacy of this remedy should be a matter of fact, surgeons will possess another means of curing nocturnal blindness, besides that which we have been explaining.

Celsus, in the chapter on Mydriasis, has the following words: *Quidam sine ullâ manifestâ causâ subitò obcæcati sunt. Ex quibus nonnulli, cùm aliquandiù nihil vidissent, repentinâ profusione alvi lumen recuperant. Quò minùs alienum videtur, et recenti re, et interposito tempore medicamentis quoque moliri dejectiones, quæ omnem noxiam materiam per inferiora depellant.* This passage, Scarpa thinks, refers not only to the treatment of the dilated pupil, but also to that of the imperfect amaurosis, which occurs suddenly; and it appears to him to merit the attention of practitioners.

The first part of what Celsus has stated, viz. that persons who have been for some time affected with amaurosis, have regained their sight on being attacked by a diarrhœa, seems to Scarpa to be corroborated by the case, related by Doctor Pye. (*Med. Obs and Inq. Vol.* 1.) A man, forty years of age, says he, had been affected for two months with periodical amaurosis, which, for a certain time, had occurred regularly every evening, but afterwards came on irregularly, at different intervals, with considerable dilatation of the pupil, and such obscuration of sight on the approach of night, that even the light of a candle could not be discerned. The man was seized with a diarrhœa. Doctor Pye ordered him to take, for eight successive days, a potion with the kali præparatum; then he prescribed an electuary, composed of bark, nutmeg, and sirup of orange-peel. The two latter ingredients were added to the bark, on account of the continuance of the diarrhœa. The second day after the electuary was taken, the diarrhœa increased, and the patient vomited copiously; after which he suddenly recovered his sight, so as to see equally well by day and by night. As the diarrhœa continued, the electuary was omitted, after having been taken two days. A violent fever succeeded the diarrhœa, and, it was remarked that, during the highest stage of the former, the patient became rather deaf, but without losing his sight in the night or day-time. Doctor Pye does not mention what steps were taken to moderate the fever, which proved fatal to the patient. At all events, adds Scarpa, it is a fact, that this spontaneous laxness of the bowels entirely freed the man from the imperfect periodical amaurosis. Scarpa entertains no doubt, that, by looking attentively into the numerous collection of medical observations, one might find in them a great many facts similar to the preceding one, shewing the influence of what he terms morbific gastric stimuli over the organ of sight, and,

consequently, the great utility of a spontaneous looseness of the bowels in the cure of the imperfect amaurosis.

But, says Scarpa, even if such examples of the incomplete amaurosis being dissipated in consequence of spontaneous vomiting, or copious evacuations from the bowels, produced entirely by nature, were rare, and noticed by few, we now have so many observations, evincing the successful cure of this disease by means of such evacuations, artificially produced by emetics, and internal resolvents, that no doubt whatever can be entertained, concerning the accuracy of the second part of Celsus's admonition, relative to the present view of the imperfect amaurosis: *et recenti re, et interposito tempore, medicamentis quoque moliri dejectiones, quæ omnem noxiam materiam per inferiora depellant.* Of this Scarpa remarks, we undoubtedly have numerous, satisfactory proofs, in the accurate observations, related by Schmucker and Richter; but our confidence, says Scarpa, in the above method of curing the imperfect and periodical amaurosis, must increase, when we take notice, that the most respectable practitioners of past times, have, in the majority of cases, cured this disease only by means of emetics, and internal resolvents, though, in their writings, they may have imputed the success of the treatment to other causes, or the efficacy of other remedies, which they prescribed conjointly with emetics, and resolvents.

Scarpa, after several valuable remarks on amaurosis in general, refers to the *Mercure de France*, for February, 1756, where there is an account of the cures performed by Fournier, on several subjects, affected with hemeralopia. The first were three soldiers, to whom an emetic was administered, after bleeding them. The next day, as they also complained of a heaviness in their head, and nausea, the bleeding and emetic were repeated. This expedient removed all the above symptoms, and these three soldiers were no longer unable to see in the night-time. Fournier met with equal success, in treating eight other soldiers upon the same plan, who were affected with the same disease, and belonged to the same garrison.

Scarpa notices, that Pellier (*Recueil de Mem. et Obs. sur l'Œil. Obs.* 132.) cured Captain Micetti of an hemeralopia by repeated doses of tartar-emetic, a seton in the nape of the neck, and cooling, aperient beverages. Pellier also assures us, that he has several times cured the recent imperfect amaurosis, by means of small doses of tartar-emetic, and topical aromatic fumigations. (*Observ.* 136—138.) (See *Scarpa sulle Malattie degli Occhi. Venezia*, 1802.)

HEMIOPIA. (from ἡμισυς, half, and ὠψ, the eye.) A certain disorder of the eye, in which the patient cannot see the whole of any object, which he is looking at, but only a part of it. Sometimes, he sees the middle, but not the circumference; sometimes the circumference, but not the centre; while, on other occasions, it is only the upper, or lower half, which is discerned. Sometimes objects are seen thus imperfectly, whether distant, or near; sometimes, only when they are near, and not at a great distance.

The causes of the hemiopia are divided by Richter into four kinds.

To the first belong opacities of the cornea and crystalline lens, especially, such as destroy the transparency of only a certain portion of these parts.

The cure of this species of hemiopia depends upon the removal of the partial opacity from which it originates. (See *Cataract*, and *Cornea, Opacities of.*)

Under certain circumstances, persons, whose upper eyelid cannot be properly raised, are affected with hemiopia. They can only discern the lower half of an object, which is near and of large size, unless they go further from it, draw their heads backward, or turn their eyes downward. The pupil, in particular instances, becomes drawn away from the middle of the iris. This may also be a cause of hemiopia: it is a case, that does not admit of a cure. The affection may likewise proceed from a separation of the iris from the margin of the cornea by external violence, or other causes. Here the cure is equally impracticable.

The foregoing species of hemiopia are merely effects of other diseases. The fourth and last kind is the most important, being generally regarded as an independent disorder. Sometimes, it appears rather to be the effect of a sudden and transient irritation, producing a morbid sensibility in the optic nerve.

The causes of this sort of case, if we can credit Richter, are mostly seated in the abdominal viscera. When the affection is more durable, forming what has been termed *amaurosis dimidiata*, the same treatment is indicated, as in the paralytic affections of the retina and optic nerve, in which last disorders, indeed, it often terminates. (See *Richter's Anfangsgrunde der Wundarzn. Band.* 3, *Kap.* 17.)

HEMORRHAGE, (from αἱμα, blood, and ῥηγνυμι, to break out.) *Hæmorrhagia, Bleeding.*

This is doubtless one of the most important subjects in Surgery. The fear of hemorrhage in fact retarded the improvement of our profession for ages; for the ancients, ignorant how to stop bleeding, were afraid to cut out the most trivial tumour, or they did so with terror. They generally performed operations slowly and imperfectly, by means of burning-irons,

or ligatures, which the moderns execute quickly and safely with a knife. If the old surgeons ventured to amputate a limb, they only did so, when it had mortified, by dividing the dead parts, and so great was their apprehension of bleeding, that they only dared to cut parts which could no longer bleed. (*John Bell's Principles of Surgery, Vol.* 1. *p.* 142.) But, not only as a consequence of surgery, is hemorrhage to be feared; it is also one of the most alarming accidents, which surgery is called upon to relieve. "*Un sentiment naturel attache à l'idée de perdre son sang; un terreur machinale, dont l'enfant, qui commence à parler, et l'homme le plus décidé, sont également susceptibles. On ne peut point dire, que cette peur soit chimérique. Si l'on comptoit ceux, qui perdent la vie dans une bataille, on verroit, que les trois quarts ont péri par quelque hemorrhagie; et dans les grandes opérations de chirurgie cet accident est presque toujours le plus formidable.*" (*Morand. Mem. de l'Acad. Royale de Chirurgie, Vol.* 5. 8vo. See *Jones on Hemorrhage.*)

As the blood circulates in the arteries with much greater impetus and rapidity, than in the veins, it necessarily follows, that their wounds are generally attended with much more hemorrhage, than those of the latter vessels, and that such hemorrhage is more difficult to suppress. However, as the blood also flows through veins, of great magnitude, with great velocity, bleedings from them are frequently highly dangerous, and sometimes unavoidably fatal. When an artery is wounded, the blood is of a bright scarlet colour, and gushes from the vessel *per saltum*, in a very rapid manner. The blood issues from a vein in an even, unbroken stream, and is of a dark purple red colour. It is of great practical use to remember, these distinguishing differences, between arterial and venous hemorrhage, because, though the oozing of blood may be in both cases equal in quantity, yet, in the latter instance, one is often justified in bringing the sides of a wound together, without taking farther means to suppress the bleeding, while it would not be proper to adopt the same conduct, were there an equal oozing of arterial blood.

Dr. Jones has favoured the world with a matchless work, on the present subject; and as one grand object of this Dictionary is to convey a careful account of all the latest improvements in surgical science, I shall first endeavour to make the reader acquainted with the more accurate ideas, which this gentleman has lately published, relative to the doctrines of hemorrhage. Afterwards, we shall consider the surgical means to be practised in different cases.

The sides of the arteries are divisible into three coats. The *internal one* is extremely thin, and smooth. It is elastic, and firm, (considering its delicate structure) in the longitudinal direction, *but so weak in the circular as to be very easily torn by the slightest force applied in that direction.* Its diseases shew, that it is vascular, and it is also probably sensible.

The *middle coat* is the thickest, and is composed of muscular fibres, all arranged in a circular manner; they differ, however, from common muscular fibres in being more elastic, by which they alone keep a dead artery open, and of a cylindrical form. As this middle coat has no longitudinal fibres, *the circular fibres are held together by a slender connexion, which yields readily to any force, applied in the circumference of the artery.*

The external coat is remarkable for its whiteness, density, and great elasticity. *When an artery is surrounded with a tight ligature, its middle and internal coats are as completely divided by it, as they could be by a knife, while the external coat remains entire.*

Besides these proper coats, all the arteries, in their natural situations, are connected, by means of fine cellular substance, with surrounding membranous sheaths. *If an artery be divided, the divided parts, owing to their elasticity, recede from each other, and the length of the cellular substance, connecting the artery with the sheath, admits of its retracting a certain way within the sheath.*

Another important fact is: *that when an artery is divided, its truncated extremities contract in a greater, or less, degree, and the contraction is generally, if not always, permanent.*

Arteries are furnished with arteries, veins, absorbents, and nerves; *a structure, which makes them susceptible of every change to which living parts are subjected in common; enables them to inflame, when injured, and to pour out coagulating lymph, by which the injury is repaired, or the tube permanently closed.* (See Jones on Hemorrhage.)

M. Petit, the surgeon, was the first, who, in 1731, endeavoured to explain the means, which nature employs for the suppression of hemorrhage. He thought, that bleeding from a divided artery is stopped by the formation of a coagulum of blood, which is situated partly *within*, and partly *without* the vessel. The clot, he says, afterwards adheres to the inside of the artery, to its orifice, and to the surrounding parts; and, he adds, that when hemorrhage is stopped by a ligature, a coagulum is formed above the ligature, which only differs in shape, from the one, which takes place when no ligature is employed. His opinion leads him to recommend compression to support the coagulum.

In 1736, M. Morand published additional interesting remarks. He allowed, that a coagulum had some effect in stop-

ping hemorrhage; but, contended, that a corrugation, or plaiting, of the circular fibres of the artery which diminish its canal, and a shortening and consequent thickening of its * *longitudinal ones*, which nearly rendered it impervious, had some share in the process. He thought that the cavity of an artery might be obliterated, by the puckering, or corrugation, when *circular pressure, as that of a ligature, is made.*

Morand erred chiefly in explanation; for, the *contraction* and *retraction* of divided arteries are indisputable facts, and, as Dr. Jones remarks, this does not affect the truth of his general conclusion, *that the change, produced on a divided artery, contributes with the coagulum to stop the flow of blood.*

Mr. Samuel Sharp (*2d. Edit. of Operations of Surgery*, 1739,) supported the same doctrine. "The blood-vessels, immediately upon their division, bleed freely, and continue bleeding, till they are either stopped by art, or, at length contracting, and withdrawing themselves into the wound, their extremities are shut up by coagulated blood."

Pouteau (*Mélanges de Chirurgie*, 1760,) denied, that a coagulum is always found after an artery is divided; and, when it is, he thought it only a feeble and subsidiary means towards the suppression of hemorrhage. He contended, that the retraction of the artery had not been demonstrated, and could not be more effectual, than a coagulum. His theory was, that the swelling of the cellular membrane, at the circumference of the cut extremity of the artery, forms the principal impediment to the flow of blood; and that a ligature is useful in promoting a more immediate and extensive induration of the cellular substance.

Gooch, White, Aikin, and Kirkland, all oppose Petit's doctrine of coagulum. The first blends some of Pouteau's theory with his own, by observing, that "when a small artery is totally divided, its retraction may bring it under the surrounding parts, and with the natural contraction of the diameter of its mouth, assisted by the compressive power of those parts, increased by their growing tumid, the efflux of blood may be stopped."

White was convinced, from what Gooch had suggested, and Kirkland confirmed, that the arteries, by their natural contraction, coalesce, as far as their first ramification.

Dr. Jones admits, that an artery contracts after it has been divided, and his experiments authorize him to say, that the contraction of an artery is an important means, but, certainly not the only, nor even the chief means, by which hemorrhage is stopped. The impetuous flowing of the blood through the wound of the artery would resist the contraction of the vessel in such a degree, that would, in almost every instance, be attended with fatal consequences, when the artery is above a certain size, were it not for the formation of a coagulum. (*Jones.*)

Mr. J. Bell thinks, that when hemorrhage stops of its own accord, it is neither from the retraction of an artery, nor the constriction of its fibres, nor the formation of clots, but, by the cellular substance, which surrounds the artery, being injected with blood.

We must refer the reader to Dr. Jones's work for a complete exposure of the inconsistences and absurdities in Mr. Bell's account of his own theory, (See *P.* 25, *&c.*)

Dr. Jones very accurately concludes his criticisms on Mr. Bell with observing, that if this gentleman really means to confine his doctrine of the natural means of suppressing hemorrhage to the injection of the cellular substance, round the artery, with blood, he dwells improperly on one of the attendant circumstances to the exclusion of the retraction, and contraction of an artery, and the formation of a distinct clot, all primary parts of the process.

The blood, besides filling the cellular substance round the artery, also fills the cellular substance at the mouth of the artery in a particular manner; for, the divided vessel, by its retraction within its cellular sheath, leaves a space of a determinate form, which, when all the circumstances necessary for the suppression of hemorrhage operate, is gradually filled up by a distinct clot. (*Jones.*)

MEANS OF NATURE IN STOPPING BLEEDING FROM DIVIDED ARTERIES.

Dr. Jones has given a faithful and accurate detail of a series of experiments on animals, which demonstrate "that the blood, the action, and even the structure of the arteries, their sheath, and the cellular substance connecting them with it," are concerned in stopping bleeding from a divided artery of moderate size, in the following manner: "An impetuous flow of blood, a sudden and forcible retraction of the artery within its sheath, and a slight contraction of its extremity, are the immediate, and almost simultaneous, effects of its division. The natural impulse, however, with which the blood is driven on, in some measure counteracts the retraction, and resists the contraction of the

* *Anatomists do not acknowledge that such exist.*

artery. The blood is effused into the cellular substance, between the artery and its sheath, and passing through that canal of the sheath, which had been formed by the retraction of the artery, flows freely externally, or is extravasated into the surrounding cellular membrane, in proportion to the open, or confined state of the wound. The retracting artery leaves the internal surface of the sheath uneven, by lacerating, or stretching the cellular fibres, that connected them. These fibres entangle the blood, as it flows, and thus the foundation is laid for the formation of a coagulum at the mouth of the artery, and which appears to be completed by the blood, as it passes through this canal of the sheath, gradually adhering and coagulating, around its internal surface, till it completely fills it up from the circumference to the centre." (*Jones*, *p.* 53.)

The effusion of blood into the surrounding cellular membrane, and between the artery and its sheath; but, in particular, the diminished force of the circulation from loss of blood, and a speedy coagulation of this fluid in this circumstance, most essentially contribute, says Dr. Jones, to the desirable effect.

It appears then, that a coagulum, which Dr. Jones calls the *external* one, at the mouth of the artery, and within its sheath, forms the first complete obstacle to the continuance of bleeding, and though it seems externally like a continuation of the artery, yet, on slitting open this vessel, its termination can be plainly observed, with the coagulum shutting up its mouth, and contained in its sheath. (*Jones*, *p.* 55.)

No collateral branch being very near the impervious mouth of the artery, the blood just within it is at rest, and usually forms a slender conical coagulum, which neither fills up the canal of the artery, nor adheres to its sides, except by a small portion of the circumference of its base, near the extremity of the vessel. This coagulum is distinct from the former, and what Dr. Jones calls the *internal* one.

The cut end of the artery next inflames, and the vasa vasorum pour out lymph, which fills up the extremity of the artery, is situated between the internal and external coagula, is somewhat intermingled with them, or adheres to them, and is firmly united all round to the internal coat of the vessel. Dr. Jones further states, that the permanent suppression of the hemorrhage chiefly depends on this coagulum of lymph; but, that the end of the artery is also secured by a gradual contraction, which it undergoes, and by an effusion of lymph between its tunics, and into the surrounding cellular substance; whereby these parts become thickened, and so incorporated with each other, that one cannot be discerned from the other. Should the wound in the integuments not heal by the first intention, the coagulating lymph, soon effused, attaches the artery firmly to the subjacent and lateral parts, gives it a new covering, and entirely excludes it from the outward wound. (*Jones*, *p.* 55.)

The same circumstances are also remarkable in the portion of the vessel, most remote from the heart. Its orifice, however, is usually more contracted, and its external coagulum smaller, than the one, which attaches itself to the other cut end of the artery. (*Jones on Hemorrhage*, *p.* 56.)

The impervious extremity of the artery, no longer allowing blood to circulate through it, the portion, which lies between it and the first lateral branch gradually contracts, till its cavity is completely obliterated, and its tunics assume a ligamentous appearance. The external coagulum, which, in the first instance, had stopped the hemorrhage, is absorbed in a few days, and the coagulating lymph, effused around it, and by which the parts were thickened, is gradually removed, so that they resume again their cellular texture. (*Jones*, *p.* 57.)

At a still later period, the ligamentous portion is reduced to a filamentous state, so that the artery is, as it were, completely annihilated from its cut end to the first lateral branch. Long, however, ere this final change is accomplished, the inosculating branches have become considerably enlarged, so as to establish a free communication, between the disunited parts of the main artery. (*Jones*, *p.* 58.)

When an artery has been divided *at some distance from a lateral branch*, three coagula are formed: one of blood externally, which shuts up its mouth; one of lymph, just within the extremity of its canal; and one of blood, within its cavity, and contiguous to that of lymph. But, when the artery has been divided near a lateral branch, no internal coagulum of blood is formed. (*Jones*, *p.* 63.)

The external coagulum is always formed, when the divided artery is left to nature; not so, however, if art interferes, for under the application of the ligature it can never form. If agaric, lycoperdon, or sponge, be used, its formation is doubtful, depending entirely upon the degree of pressure, that is used; but, the internal coagulum of blood will be equally formed, whether the treatment be left to art, or nature, if no collateral branch is near the truncated extremity of the artery; and lastly, effused lymph, which, when in sufficient quantity, forms a distinct coagulum, just at the mouth of the artery, will

be always found, if the hemorrhage is permanently suppressed. (*Jones, p.* 74.)

MEANS, WHICH NATURE EMPLOYS FOR SUPPRESSING THE HEMORRHAGE FROM PUNCTURED, OR PARTIALLY DIVIDED ARTERIES.

The suppression of hemorrhage by the natural means is much more easily accomplished, when an artery is completely divided, than when merely punctured, or partially divided. Completely dividing a wounded artery was one means practised by the ancients in order to stop hemorrhage: the moderns frequently do the same thing, when bleeding from the temporal artery proves troublesome.

Dr. Jones has related many experiments, highly worthy of perusal, and which were undertaken to investigate the present part of the subject of hemorrhage. This gentleman, however, owns, that, in regard to the temporary means by which bleeding from a punctured artery is stopped, he has but little to add to what Petit has explained, in his third publication on hemorrhage. (*Mem. de l'Acad. des Sciences;* 1735.) The blood is effused into the cellular substance, between the artery and its sheath, for some distance, both above and below the wounded part; and when the parts are examined, a short time after the hemorrhage has completely stopped, we find a stratum of coagulated blood between the artery and its sheath, extending from a few inches below the wounded part to two, or three inches above it, and somewhat thicker, or more prominent over the wounded part, than elsewhere.

Hence, rather than say the hemorrhage is stopped by a coagulum, it is more correct to say, that it is stopped by a thick lamina of coagulated blood, which, though somewhat thicker at the wounded part, is perfectly continuous with the coagulated blood lying between the artery and its sheath. (*Jones, p.* 113.)

When an artery is punctured, the hemorrhage, immediately following, by filling up the space, between the artery and its sheath, with blood, and consequently, distending the sheath, alters the relative situation of the puncture in the sheath to that in the artery, so that they are not exactly opposite to each other; and by that means a layer of blood is confined by the sheath over the puncture in the artery, and, by coagulating there, prevents any further effusion of blood.

But, this coagulated blood, like the external coagulum of a divided artery, affords only a temporary barrier to the hemorrhage: its permanent suppression is effected by a process of reparation, or of obliteration.

Dr. Jones's experiments shew, that an artery, if wounded only to a moderate extent, is capable of reuniting and healing so completely, that, after a certain time, the cicatrization cannot be discovered, either on its internal, or external surface; and that even oblique and transverse wounds (which gape most) when they do not open the artery to a greater extent, than one-fourth of its circumference, are also filled up and healed by an effusion of coagulating lymph from their inflamed lips, so as to occasion but little, or no obstruction to the canal of the artery. The utmost magnitude of a wound, which will still allow the continuity of the canal to be preserved, is difficult to be learnt; for, when the wound is large, but yet capable of being united, such a quantity of coagulating lymph is poured out, that the canal of the vessel, at the wounded part, is more or less filled up by it. And when the wound is still larger, the vessel becomes either torn, or ulcerated completely across, soon afterwards, by which its complete division is accomplished.

The lymph, which fills up the wound of an artery, is poured out very freely both from the vessel and the surrounding parts, and it accumulates around the artery, particularly, over the wound, where it forms a more distinct tumour. The exposed surrounding parts at the same time inflame, and pour out coagulating lymph, with which the whole surface of the wound becomes covered, and which completely excludes the artery from the external wound. This lymph granulates, and the wound is filled up and healed in the usual manner. (See *Jones on Hemorrhage, p.* 113, *&c.*)

SURGICAL MEANS OF SUPPRESSING HEMORRHAGE.

It must be plain to every one, who understands the course of the circulation, that pressure, made on that portion of a wounded artery, which adjoins the wound towards the heart, must check the effusion of blood. The current of blood in the veins, running in the opposite direction, requires the pressure to be applied to that side of the wound, which is most remote from the heart. As pressure is the most rational means of impeding hemorrhage, so it is the most effectual; and almost all the plans, employed for this purpose, are only modifications of it. The tourniquet, the ligature, the application of a roller and compresses, even agaric itself, only become useful in the suppression of hemorrhage, on the principle of pressure, the cautery, caustics, and styptics excepted.

MEANS EMPLOYED BY THE ANCIENTS.

In order to prevent a wounded person from dying of hemorrhage, Celsus advises the wound to be filled with dry lint, over which is to be laid a sponge dipped in cold water, and pressed on the part with the hand. If, notwithstanding this, the hemorrhage should continue, he recommends repeatedly applying fresh lint, wet with vinegar; but, he is against the use of corroding escharotic applications, on account of the inflammation, which they produce; or only sanctions the employment of the mildest ones. When the hemorrhage resists these methods, *he advises two ligatures to be applied to the wounded part of the vessel, and then to divide the portion situated between them:*—"*Quòd si illa quoque profluvio vincunter, venæ, quæ sanguinem fundunt, apprehendendæ, circaque id, quod ictum est, duobus locis deligandæ, intercidendæque sunt, ut et in se ipsæ coëant, et nihilominus ora præclusa habeant.*" *Lib. 5. cap.* 26. When the ligature is impracticable, he proposes the actual cautery, if the wound should bleed sufficiently, and there should be no nerves, nor muscles at the bleeding part.

Galen also mentions tying the vessels to stop the hemorrhage from wounds; and there are some traces of the same information in other authors, who lived before him, as Archigenes, and Rufus. However, it is more than probable, that, in their days, the ligature was little used, as we must infer from the multitude of topical astringents, caustics, and other applications, which they have advised for stopping bleeding, and in which they would have put less confidence, had they been familiarly acquainted with the use of the ligature. No one can doubt, that they would very soon have tied the vessels after amputations, had they had many opportunities of seeing the advantages of the ligature; but, so far were they from adopting such practice, that, Albucasis, a long while afterwards, refused to amputate a wrist, lest he should see his patient bleed to death.

Paré passes for the first, who employed the ligature after amputation. His method having been attacked, he modestly defends it in the part of his works, intitled, *Apologie*. He takes great care to impute the origin of it to the ancients, and cites many of them, who have made mention of it. However, he thinks its utility in amputations of such high consequence, that he considers himself as inspired by the Deity in having first adopted this practice.

The method, in which the ancients placed most confidence, for stopping hemorrhage after the amputation of a limb, was the cauterization of the cut vessel, and part of the surrounding flesh. The parts, thus affected by the heat, formed an eschar, of greater, or less thickness, which blocked up the opening of the vessel, and hindered the blood from escaping. The separation of the eschar, however, which frequently took place too soon, occasioned a return of the hemorrhage, and rendered it the more dangerous, as its suppression became more difficult, than before the cautery was applied. The instrument being too much heated, even, sometimes, immediately brought away with it the eschar, which it had just formed. At the present time, the cautery is never employed, as a means of suppressing hemorrhage, or, at most, only in a few very unusual cases, in which neither compression, nor the ligature can be made use of. In Great Britain, the cautery may be said to be entirely exploded; but, in France, the best hospital surgeons now and then employ it to stop bleedings from the antrum, and the mouth.

It was once a practice to apply pledgets, dipped in boiled turpentine, to the mouths of the bleeding vessels: of this it is only necessary to say, that the method now has long been most justly abandoned.

ASTRINGENTS, STYPTICS, &c.

Le Dran, in his treatise on the operations of surgery, says, that a button of vitriol, or alum, applied and properly confined on the extremity of the vessel, is sufficient to stop the hemorrhage in amputations. Heister recommends the application of vitriol, in preference to the ligature, in the amputation of the forearm. Great praises have also been conferred on agaric, and sponge, for their styptic properties. Solutions of iron, and all the mineral acids in various forms, have been recommended to the publick, as remedies of the same kind, and possessing great efficacy. The ancients, indeed, had already exhausted this class of remedies in such a degree, that the pretended discoveries of the moderns, in this way, may almost all be met with in their writings; and the little success, attending their practice, especially, when bleeding from a considerable artery was to be suppressed, clearly shews what little reliance we ought to place on means of this description. (*Encyclopédie Méthodique; Partie Chirurgicale.*) Stypties do, indeed, possess the power of stopping some hemorrhages from small arteries; but, they ought never to be trusted, when large ones are concerned.

There is no doubt, that cold air has a styptic property; by which expression I

mean, it promotes the contraction of the vessels, for, no styptics can contribute to make the blood coagulate, though such an erroneous idea is not uncommon. We frequently tie, on the surface of a wound, every artery, that betrays the least disposition to bleed, as long as the wound continues exposed to the air. We bring the opposite sides of this wound into contact, and put the patient to bed. Not an hour elapses, before the renewal of hemorrhage necessitates us to remove the dressings. The wound is again exposed to the air, and again the bleeding ceases. This often happens in the scrotum, after the removal of a testicle, and on the chest, after the removal of a breast. The proper conduct, in such cases, is not to open the wound unnecessarily, but, to apply wet linen to the part so as to produce such an evaporation from its surface, as shall create a sufficient degree of cold to stop the bleeding. As all styptics irritate, judicious practitioners seldom apply them to recent wounds. It is sometimes, however, very proper to employ them to suppress hemorrhages from many diseased surfaces, where the vessels seem to have lost their natural disposition to contract.

COMPRESSION.

We have already remarked, that all the best means of checking hemorrhage, operate on the principle of pressure, the actual and potential cautery, and some styptics excepted; the two first of which act by forming a slough, which stops up the mouths of the vessels; while the latter operate by promoting their contraction. Let us next consider the various modifications of pressure.

M. Petit endeavours to shew, in a dissertation on the manner of stopping hemorrhage, printed in the *Mem. de l'Acad. de Sciences, année* 1731, that the different things which have been praised as infallible specifics, would seldom, or never, have succeeded without compression. It was always requisite, even when caustics were employed, to apply compresses, which were bound on with sufficient tightness to resist the impulse of the blood in the artery, and the premature separation of the eschar, occasioned by the actual or potential cautery. Had this precaution not been taken, there would have been reason to have feared hemorrhage, almost invariably, and which, indeed, did recur but too frequently, when the eschar was detached, notwithstanding the pains taken to avert it by suitable compression. M. Petit has noticed, that the end of the finger, gently compressing the mouth of a vessel, is a sufficient means of stopping hemorrhage from it, and that nothing else would be necessary, if the finger and stump could always be kept in this posture. Hence, he endeavoured to obviate these difficulties by inventing a machine which securely and incessantly executes the office of the finger. This instrument is a double tourniquet, which, when applied, compresses, at once, both the extremity of the divided artery and its trunk above the wound. The compression on the end of the vessel is to be permanent; that on the trunk is only to be made at the time of dressing the wound, or when it is necessary to relax the other. An engraving and particular description of the instrument are to be found in Petit's memoir.

Surgeons used formerly to fill the cavities of the wounds with lint, and then make pressure on the bleeding vessels, by applying compresses and a tight roller over the part. The practitioners of the present day are too well acquainted with the advantages of not allowing any extraneous substance to intervene between the opposite surfaces of a recent wound, to persist in the above plan. They know, that the sides of the wound may be brought into contact, and that compression may yet be adopted, so as both to restrain particular hemorrhages, and rather promote, than retard the union of the wound.

When the blood does not issue from any particular vessel, but from numerous small ones, compression is preferable to the ligature. The employment of the latter would render it necessary to tie the whole surface of the wound. The sides of the wound are to be brought accurately together, and compresses are then to be placed over the part, and a roller to be applied with sufficient tightness to make effectual pressure, but not so forcibly as to produce a danger of the circulation in the limb being completely stopped.

If compression can ever be safely trusted in bleedings from large arteries, it is when these vessels lie immediately over a bone, against which they can be advantageously compressed. Bleedings from the radial and temporal arteries are of this kind. Compression is sometimes tried, when the brachial artery has been wounded in phlebotomy. Here it is occasionally tried, in preference to the ligature, because the latter cannot be employed without an operation to expose the artery.

When there is a small wound in a large artery, the following plan may be tried: a tourniquet is to be applied, so as to command the flow of blood into the vessel. The edges of the external wound are next to be brought into contact.

Then, a compress, shaped like a blunt cone, and which is best formed of a series of compresses, gradually increasing in size, is to be placed with its apex exactly on the situation of the wound in the artery. This *graduated compress*, as it is termed, is then to be bound on the part with a roller.

In this manner, I lately healed a wound of the superficial palmar arch, in a young lady in Great Pulteney-street. The outward wound was very small, and though the hemorrhage was profuse, I conceived, that it might be permanently stopped, if compression could be so made as to keep the external wound incessantly and firmly covered for the space of a day or two. At first, I tried a compress of lint, bound on the part with a roller; but this proving ineffectual, I took some pieces of money, from the size of a farthing to that of a halfcrown, and, wrapping them up in linen, put the smallest one accurately over the wound, so as completely to cover it. Then the others were arranged, and all of them were firmly confined with a roller, and the arm kept as quiet as possible in a sling. They were taken off after three days, and no hemorrhage ensued.

It is to be observed, that the palmar fascia, in this instance, would prevent the compression from operating on the vessel; but the case shews, that this artery, when wounded, is capable of healing, if the blood be completely prevented from getting out of the external wound by the proper application of compression. Were the outer wound too large to admit of this plan, it would probably be necessary to dissect for the ends of the artery, in order to tie them. This operation, however, is by no means easy; and, perhaps, upon the whole, it might be better to cut down, at once, to the ulnar artery, and put a ligature round it, though this would only certainly stop the bleeding from one end of the vessel in the hand.

Besides compressing the wounded part of the artery, some surgeons also apply a longitudinal compress over the track of the vessel above the wound, with a view of weakening the flow of blood into it. Whatever good effect it may have in this way, is more than counterbalanced by the difficulty which it must create to the circulation in the arm. If the graduated compress be properly arranged, an effusion of blood cannot possibly happen, and pressure along the course of the artery must at all events be unnecessary.

After relaxing the tourniquet, if no blood escape from the artery, the surgeon (supposing it to be the brachial artery wounded) should feel the pulse at the wrist, in order to ascertain, that the compression employed is not so powerful as entirely to impede the circulation in the fore-arm and hand. The arm is to be kept quietly in a sling, and, in forty-eight hours, if no bleeding take place, there will be great reason to expect that the case will do well. In another work, I have given an engraving and description of an instrument, invented by Plenk, for making pressure on the wounded brachial artery, at the bend of the arm, without pressing upon the whole circumference of the limb, and consequently stopping the circulation. No one, however, would prefer compression when large arteries are injured, except in the kind of cases, to which we have just adverted, or in those in which the wounded vessel can be firmly compressed against a subjacent bone. The compresses sometimes slip off, or the bandages become slack, so that a fatal hemorrhage may arise. Hence, when this method is adopted, the tourniquet should always remain loosely round the limb, ready to be tightened in an instant. Sometimes the external wound heals, while the opening in the artery remains unclosed, and an aneurism is the consequence. This is particularly apt to occur, when the pressure has not been powerful enough; and, when too great, mortification is apt to come on; such are the objections to placing much confidence in compression, except when the vessels are not of considerable size.

TOURNIQUET.

When hemorrhage takes place from a large artery in one of the limbs, where the vessel can be coveniently compressed above the wound in it, a tourniquet, judiciously applied, never fails in putting an immediate stop to the bleeding.

Before the invention of this instrument, which did not take place till the latter part of the 17th century, surgery was really a very defective art. No important operation could be undertaken on the extremities, without placing the patient in the most imminent peril; and the want of the aid, afforded by the tourniquet, made many wounds mortal, which otherwise would not have been attended with the least danger.

As the first invention of this instrument has been claimed by different surgeons, and even different nations, we shall not take upon us to determine where it had its origin. But whoever was the inventor, it was first presented to the publick in a form exceedingly simple; so much so, indeed, that it seems extraordinary, that its invention did not happen sooner. A small pad being placed on the principal artery of a limb, a band was applied over it, so as to encircle the

limb twice. Then a stick was introduced between the two circles of the band, and twisted: thus the pad was made to compress with quite power enough completely to stop the flow of blood into the lower part of the vessel.

Although, in the *Armamentarium Chirurgicum* of Scultetus, there is a plate of a machine, invented by this author for compressing the radial artery, by means of a screw, M. Petit is universally allowed to be the first, who brought the tourniquet to perfection, by combining the circular band with a screw, in such a manner that the greatest pressure operates on the principal artery.

The advantages of the modern tourniquet are, that its pressure can be regulated with the utmost exactness; that it operates chiefly on the point where the pad is placed, and where the main artery lies; that it does not require the aid of an assistant to keep it tense; that it completely commands the flow of blood into a limb; that it can be relaxed, or tightened in a moment; and that, when there is reason to fear a sudden renewal of hemorrhage, it can be left slackly round the limb, and, in case of need, tightened in an instant. Its utility, however, is confined to the limbs, and as the pressure necessary to stop the flow of blood through the principal artery, completely prevents the return of blood through the veins, its application cannot be made very long without inducing mortification. It is only of use also in putting a sudden stop to profuse hemorrhages for a time, that is, until the surgeon has put in practice some means, the effect of which is more permanent.

LIGATURE.

The ancients were quite unacquainted with the use of the tourniquet, and though some of their writers have made mention of the ligature, they do not seem to have known how to make proper use of it, nor to have possessed any other certain means of suppressing hemorrhage from wounds. In modern times, it is easily comprehensible, that, when any great operation was undertaken, while surgery was so imperfect, there was more likelihood of harm, than good being done to the patient. Nor can it be wondered at, that the old practitioners should have taken immense pains to invent a great many topical astringents. But now that the ligature is known to be a means which is safe, easy, and much less painful than former methods, we need no longer search for such remedies.

It may, indeed, be set down, as a rule in surgery, whenever large arteries are wounded, never to trust to any styptic application whatsoever; but to have immediate recourse to the ligature, as being, when properly applied, the most simple and safe of all methods.

In order to qualify the reader to judge of the best mode of applying ligatures to arteries, I shall first explain to him their effect on these vessels, as related by Dr. Jones.

This gentleman learnt from Mr. J. Thomson, of Edinburgh, that, in every instance in which a ligature is applied around an artery, without including the surrounding parts, the internal coat of the vessel is torn through by it, and that this fact had been originally noticed by Desault. Mr. Thomson shewed to Dr. Jones, on a portion of artery taken from the human subject, that the internal and middle coats are divided by the ligature. (*Jones*, p. 126.)

This led Dr. Jones to make some experiments on the arteries of dogs and horses, shewing, that when a ligature is applied with sufficient tightness round an artery to cut through its internal and middle coats, although it be immediately afterwards removed, the vessel always becomes permanently impervious at the part which was tied, as far as the first collateral branches above and below the obstructed part. Dr. Jones thinks it reasonable to expect, that the obstruction produced in the arteries of dogs and horses, in the manner he has related, "might be effected by the same treatment in the arteries of the human subject; and, if it should prove successful, it might be employed in some of the most important cases in surgery. The success of the late important improvements which have been introduced in the operation for aneurism, may perhaps appear to most surgeons to have rendered that operation sufficiently simple and safe; but, if it be possible to produce obstruction in the canal of an artery of the human subject, in the above-mentioned manner, may it not be advantageously employed in the cure of aneurism; inasmuch as nothing need be done to prevent the immediate union of the external wound?" Dr. Jones next questions, whether this mode of obstructing the passage of blood through the arteries may not also be advantageously practised in cases of bronchocele? (p. 136).

From Dr. Jones's experiments, it appears, that the first effects of a ligature upon an artery are, a complete division of its internal and middle coats, an apposition of its wounded surfaces, and an obstruction to the circulation of the blood through its canal. There must be a small quantity of stagnant blood, just within the extremity of the artery; but this does not, in every instance, immediately form a coagulum, capable of filling

up the canal of the artery. In most cases, only a slender coagulum is formed at first, which gradually becomes larger by successive coagulations of the blood; and hence, the coagulum is always at first of a tapering form, with its base at the extremity of the artery. But, as Dr. Jones remarks, the formation of this coagulum is not material; for soon after the ligature has been applied, the end of the artery inflames, and the wounded internal surface of its canal being kept in close contact by the ligature, adheres, and converts this portion of the artery into an impervious, and, at first, slightly conical sac. It is to the effused lymph that the base of the coagulum adheres, when found to be adherent. Lymph is also effused between the coats of the artery, and among the parts surrounding its extremity. In a little time, the ligature makes the part, on which it is directly applied, ulcerate; and, acting as a tent, a small aperture is formed in the layer of lymph effused over the artery. Through this aperture, a small quantity of pus is discharged, as long as the ligature remains; and, finally, the ligature itself also escapes, and the little cavity, which it has occasioned, granulates and fills up, and the external wound heals, leaving the cellular substance a litle beyond the end of the artery, much thickened and indurated. (*Jones, p.* 159, 161.)

In short, when an artery is properly tied, the following are the effects, as enumerated by Dr. Jones:

1. To cut through the internal and middle coats of the artery, and to bring the wounded surfaces into perfect apposition.

2. To occasion a determination of blood to the collateral branches.

3. To allow of the formation of a coagulum of blood just within the artery, provided a collateral branch is not very near the ligature.

4. To excite inflammation on the internal and middle coats of the artery, by having cut them through, and, consequently, to give rise to an effusion of lymph, by which the wounded surfaces are united, and the canal is rendered impervious; to produce a simultaneous inflammation on the corresponding external surface of the artery, by which it becomes very much thickened with effused lymph; and, at the same time, from the exposure and inevitable wounding of the surrounding parts, to occasion inflammation in them, and an effusion of lymph, which covers the artery, and forms the surface of the wound.

5. To produce ulceration in the part of the artery, around which the ligature is immediately applied, viz. its external coat.

6. To produce indirectly a complete obliteration, not only of the canal of the artery, but even of the artery itself, to the collateral branches on both sides of the part which has been tied.

7. To give rise to an enlargement of the collateral branches. (*Jones, p.* 163, 164.)

Every part of an artery is organized in a similar manner to the other soft parts, and its coats are susceptible of the same process of adhesion, ulceration, &c. as the other parts are. Hence, the precautions taken to secure the adhesion of other parts, should be observed for the same purpose, with regard to an artery. The vessel is put in a state to admit of adhesion by the ligature, which, when properly applied, cuts through its internal and middle coats, keeps their cut surfaces in contact, and affords them an opportunity of uniting by the adhesive inflammation, as other cut surfaces do. The immediate stoppage of the bleeding is merely the incipient and temporary part of what the ligature has to accomplish; it has also to effect the adhesion of the internal and middle coats of the artery, which being the thing, on which the permanent suppression of hemorrhage depends, is the most important. The size and form of the ligature, whether completely flat, or irregular, have not been, as Dr. Jones remarks, sufficiently attended to; nor is the degree of force employed in tying the artery, often considered. Some surgeons, wishing to guard against the ligature's slipping off, tie it with very considerable force; while others, apprehensive lest they should cut through the artery, or occasion too early a separation of the ligature, draw it only sufficiently tight to prevent the escape of any blood. A broad flat ligature is not likely to make such a wound in the internal and middle coats of the artery, as is most favourable to adhesion, because it is scarcely possible to tie it smoothly round the vessel, which is very likely to be thrown into folds, or puckered by it, and, consequently, to have an irregular bruised wound made in its middle and internal coats. By covering also a considerable space of the external coat, it may destroy the very vessels which pass on it in their way to the cut surfaces of the inner coats, and thus render them incapable of inflaming. Even supposing the wound to unite, still such a ligature may cover that part of the external coat, which is directly over the newly-united part, and, consequently, as soon as it has produced ulceration through the external coat, it will cause the same effect on the newly-united parts, and, of course, secondary hemorrhage. (*Jones, p.* 168.)

When a ligature is of an irregular

form, it is apt to cut through the internal and middle coats of an artery more completely at some parts than others; but these coats must be perfectly cut through, in order to produce an effusion of lymph from the inside of the vessel, which seems to adhere only at its cut surfaces.

Also, when the ligature is not applied with sufficient tightness, the inner coats of the artery will not be properly cut through. Dr. Jones thinks, the ligature being sometimes put on so as to deviate from a circle, has a tendency to produce secondary hemorrhage.

Dr. Jones thinks ligatures are best, when they are round, and very firm, and, he adds, that though a very slight force is necessary to cut through the internal and middle coats of an artery, it is better to tie the vessel more tightly than is necessary merely to cut through its inner coats, because the cut surfaces will thus be more certainly kept in contact; the separation of the ligature expedited; and the danger of ulceration spreading to the newly cicatrized part diminished. The external coat will never ulcerate through, before the inner ones have adhered. The limb, however, should be kept in a perfectly quiet state.

I am sincerely glad to find, that so accurate an observer as Dr. Jones, has refuted the idea, that ligatures occasionally slip off the vessels, in consequence of the violent impulse of the blood. In fact, the blood does not continue to be impelled against the extremity of the artery with the same impetuosity with which it circulated through the vessel before it was tied. The blood is immediately determined into the collateral branches, nor is there any pulsation for some way above the ligature.

Dr. Jones much more rationally imputes this occasional occurrence, either to the clumsiness of the ligature, which prevents its lying compactly and securely round the artery; or to its not having been applied with sufficient tightness; or to its having that very insecure hold of the vessel, which the deviation from the circular application must occasion. (*P.* 173.)

Dr. Jones is of opinion, that, in cases of aneurism, in which the artery has only been tied with one ligature, and left undivided, and in which secondary hemorrhage has arisen, that this has most probably been owing, either to a diseased state of the artery; to various contrivances for compressing a large portion of the vessel, or having a loose ligature above the one, which is tied; or, lastly, to not tying the artery sufficiently tight to cut through the internal and middle coats, so as to fit them for adhesion, but, so as to cause a gradual ulceration through them, and, of course, bring on hemorrhage, which returns with greater violence, as the ulceration advances. (*P.* 176.)

Dr. Jones seems to consider, that the advantage of the retraction of the *divided* artery within the cellular membrane, is compensated, in the case of the *undivided* artery, by the speedy and profuse effusion of lymph, which takes place over and round the vessel, at the tied part, and even covers the ligature itself. However, he admits the objection, urged by Mr. Abernethy, to using only one ligature, viz. that the vessel cannot be tied, where it lies among its natural connexions, or if tied in this manner either at the upper, or lower part of the wound, the hemorrhage will proceed from that part of the vessel, which has the detached portion of the artery for its extremity. This gentleman concludes this point, with allowing it to be *safest and best to apply two ligatures, and to divide the artery between them.* *P.* 179. *See Aneurism.* Another cause of secondary hemorrhage is by including other parts in the ligature, together with the artery, by doing which, the division of the inner coats of the vessel may be prevented.

In the valuable publication of Dr. Jones's, to which we have so freely adverted, some secondary hemorrhages are also imputed to the hidden separation, or laceration of the recently united parts of an artery, by premature and extraordinary exertions of the patient. Hence, he strongly insists on keeping a limb, in which a large artery has been tied, perfectly at rest.

We shall conclude our remarks on the ligature with a few practical rules.

1. Always tie a large artery, as separately as possible, but still let the ligature be applied to a part of the vessel, which is close to where it lies among its natural connexions.

Besides the reasons for this practice, already specified, we may observe, that including other substances in the ligature causes immense pain, and a larger part of a wound to remain disunited. The ligature is also apt to become loose, as soon as the substance between it and the artery sloughs, or ulcerates. Sometimes the ligature thus applied, forms a circular furrow in the flesh, and remains a tedious time, incapable of separation.

The blood-vessels being thus organized like other parts, the healing of the wounded artery can only take place favourably, when that part of the vessel, which is immediately contiguous to the ligature, continues to receive a due supply of blood through its vasa vasorum, which are ramifications of the collateral arteries. Hence, the disadvantage of putting a li-

gature round the middle of a portion of an artery, which has been separated from its surrounding connexions. Hence, the utility, however, of making the knot, as closely as possible to that part of the vessel which lies undisturbed among the surrounding flesh.

Small arteries neither allow nor require these minute attentions to the mode of tying them.

2. When a divided artery is large, open-mouthed, and very visible, it is best to take hold of it, and raise its extremity, a little way above the surface of the wound with a pair of forceps. When the vessel is smaller, the tenaculum is the most convenient instrument.

3. While one surgeon holds the vessel in this way, another is to place the noose of a ligature round it, and tie it according to the above directions. In order that the noose may not rise too high, and even above the mouth of the artery, when it is tightened, the ends of the ligature must be drawn as horizontally as possible, which is best done with the thumbs. A knot is next to be made.

4. Ligatures always operating in wounds as extraneous bodies, and one end of each being sufficient for its removal, the other should always be cut off close to the knot, and taken away.

5. When a large artery is either partially divided, or completely divided, two ligatures, one to the upper, the other to the lower part of the vessel, are commonly necessary, in consequence of the anastomosing branches conveying the blood so readily into the part of the artery most remote from the heart, as soon as the first ligature has been applied.

6. When a large artery is only punctured; when compression cannot be judiciously tried; and when the hemorrhage continues; the vessel must be first exposed by an incision, and then a double ligature introduced under it, with the aid of an eye-probe. One ligature is to be tied above; the other below the bleeding orifice; with due attention to the principles already advanced.

7. Ligatures usually come away from the largest artery ever tied, in about a fortnight, and from moderate-sized ones in six or seven days. When they continue attached much beyond the usual period, it is proper to draw them very gently every time the wound is dressed, for the purpose of accelerating their detachment. Great care, however, is requisite in doing this; for, as Dr. Jones remarks, as long as the ligature seems firmly attached, pulling it rather strongly must act, more or less, on the recently cicatrized extremity of the artery, which is not only contiguous to it, but is still united to that portion of the artery, (the external coat) which detains the ligature. (*Jones*, p. 162.)

For information concerning hemorrhage, consult *Petit's Memoirs, among those of l'Acad. des Sciences for the yeats* 1731, 1732—1735: *Morand sur le Changement, qui arrive aux Artères coupées*, 1736: *Pouteau's Mélanges de Chirurgie: Gooch's Chirurgical Works, Vol.* 1.: *Kirkland's Essay on the Method of suppressing Hemorrhages from divided Arteries: White's Cases in Surgery: J. Bell's Principles of Surgery, Vol.* 1.: *Partie Chirurgicale de l'Encycl. Méth.: Larrey's Mémoires de Chirurgie Militaire, Tom.* 2, *p.* 379. *Pelletan's Clinique Chirurgicale, Tom.* 2, *p.* 240, *&c. Mémoire Elémentaire sur les Hemorrhogies. Richerand's Nosographie Chirurgicale, Tom.* 4. *Sect. sur les Maladies des Artères, p.* 31, *&c. Edit.* 2. *Levéillé, Nouvelle Doctrine Chirurgicale, Tom.* 1, *Chap.* 3. *and, particularly, Jones on the Process employed by Nature, in suppressing the Hemorrhage from divided and punctured Arteries.* 1805.

HEMORRHOIDS. (from αἷμα, blood, and ῥέω, to flow.) *Hæmorrhoides. Piles.* The etymological meaning of the word is evidently only a discharge of blood. Surgeons, however, sanctioned by long custom, always imply by the term, *hemorrhoids*, either a bleeding from the veins of the lower part of the rectum, or else a considerable distention of these vessels, so as to form tumours, but quite unattended with hemorrhage. When the dilated veins do not bleed, the swellings are called *blind piles;* but, when they are attended with occasional discharges of blood, they are named *open piles.* These tumours vary in number, size, form, and situation: some are *external*, others *internal.* In general, the inconvenience which they occasion, is very supportable; but, sometimes they bring on very serious complaints, either by bursting and discharging blood so profusely as dangerously to reduce the patient; or by exciting inflammation of the adjacent parts, and causing abscesses and fistulæ; or, lastly, by becoming strangulated by the contraction of the sphincter ani, so as to occasion very acute pain. Piles, which bleed but little, are not of much consequence; but those which bleed profusely, cause violent pain, or which induce inflammation, and all its effects, demand the greatest attention. Lieutaud makes mention of a person, who lost three quarts of blood from some open piles in the course of a couple of days; and the heretic Arius, and the celebrated philosopher Copernicus are said to have bled to death in this manner.

When piles are situated far up in the rectum, they are commonly less painful, than when low down. In the former case, the veins are surrounded by soft and

yielding substances, which do not make any painful pressure on the swellings; but, piles, situated towards the anus, are apt to suffer a very painful constriction from the action of the sphincter muscle. Hence, when such tumours are very high up in the rectum, the patient has sometimes no warning of his disorder, till he discharges blood from the rectum, and, so violent a bleeding may at once ensue, as to prove fatal.

With regard to the cause of hemorrhoids, any thing capable of retarding the return of blood through the hemorrhoidal veins, may occasion the disease. The pressure of the gravid uterus, costiveness, and the frequent retention of hardened feces in the rectum, are very frequent causes. Persons, who lead sedentary lives, are often troubled with the complaint. From what has been stated, we may easily discern the reason, why women are more subject to piles, than men are, though the disease is so common, that the latter are also very frequently troubled with it.

The pressure of an enlarged liver, or of water accumulated in the cavity of the peritonæum, is said sometimes to be the occasion of piles.

When these tumours are produced by the pressure of the gravid uterus, no cure can be expected till after delivery, when one generally follows spontaneously. Also, when piles are an effect of dropsy, they can only get well, after the pressure of the fluid in the abdomen has been removed by tapping. Gently laxative medicines, and an horizontal position of the body, commonly alleviate the uneasiness resulting from hemorrhoids. The application of an ointment, composed of equal parts of the powder of oak-galls, and of elder-ointment, or hog's lard, contribute to the same beneficial effect. Applying warm water to the tumours, by means of a bidet, or semicupium, is also frequently productive of great ease. When piles are constricted by the sphincter ani muscle, the pain thus arising, may often be at once removed, by pushing the swellings with the finger a little higher up the rectum. Leeches applied to the vicinity of the anus, and puncturing the dilated hemorrhoidal vessels with a lancet, for the purpose of taking away blood, are measures occasionally employed to procure ease. Mr. Ware seems to give the preference to leeches; Petit preferred the lancet.

When the number and size of hemorrhoids are so considerable, as materially to obstruct the discharge of the feces; when they are very painful, and subject to profuse bleedings; when the patient is disabled from following his usual occupations; and when all the above means are not of sufficient avail, the surgeon should recommend the removal of the tumours.

Extirpating piles with the actual cautery and caustics, as practised by the old surgeons, is now very properly altogether relinquished by modern practitioners. The only plan ever followed in the present state of surgery, is either to cut the tumours off with a pair of scissars or knife, or to apply a tight ligature round their bases, so as to make them slough away.

When piles are to be cut off, and they are not sufficiently visible, the patient must first strain, as at stool, in order to make the swellings more apparent. With the aid of a pair of dissecting forceps, the skin, covering the hemorrhoids, is then to be separated from them with the knife, but not cut away, and the tumours are to be removed. Sabatier states, that saving the skin is very essential; for, any hemorrhage which may arise, can then be more easily suppressed; and, when there are several hemorrhoids to be extirpated, the loss of substance about the anus will be less, and, of course, the patient will not be so liable to a contraction of this part, which is sometimes a very great affliction.

Mr. Ware thinks it unnecessary to remove all the swellings, when there are several of them. He remarks, that though the number of hemorrhoidal tumours, protruded through the anus, is often considerable, yet the pain which the patient suffers, is not produced equally by all of these; but, that he will point to one, or at most to two, of the tumours, whence all his pain proceeds. These will be found to be much harder and more inflamed than the rest; but, generally smaller and less prominent, protruding only just low enough to be compressed by the sphincter muscle.

Hence, Mr. Ware contends, that cutting off the whole number of hemorrhoids with a scalpel, or scissars, and tying a ligature round them, in order to make them die and fall off, are unnecessary. He says, we have only to direct our attention to the hard inflamed tumour, which is the cause of the pain, and which is not unfrequently situated in the centre of the rest. This is often not larger than the end of the little finger, and the removal of it almost instantly abates the pain, and soon makes the rest of the tumours collapse and disappear. Mr. Ware operates as follows: having secured with a common dissecting-hook, or forceps, the little hard tumour, which is often in the middle of the rest, and much darker coloured, he snips it off, as close to its basis as pos-

sible, with a sharp pair of curved scissars. The pain is trifling, and the hemorrhage so slight, that Mr. Ware says, he has rarely had occasion to use any application to check it. If the hemorrhoids are constantly protruded, the operation may be performed at any time; but, if they only appear after the feces are voided, that opportunity must be taken.

When the pain of hemorrhoids is not violent, but there is a constant distressing uneasiness, with frequent returns of a profuse debilitating hemorrhage, Mr. Ware states, that his method of operating will frequently produce a radical cure.

The excision of piles is occasionally followed by a very dangerous bleeding, as a case, related by Mr. Petit, confirms. A patient had some hemorrhoids, which were supposed to be external ones, though in fact they were not, and had only become protruded. Almost immediately after they had been cut off, the skin which had supported them, became drawn inward. An inward hemorrhage ensued, which could not be suppressed, and proved fatal in less than five hours. The rectum and colon were found full of black, coagulated blood.

After the operation, Mr. Ware advises a thick compress to be applied, wet either with cold brandy and water, or with a cold saturnine lotion, and retained on the part with the T bandage. The patient should be kept quietly in a cooler temperature than usual, and been joined to eat and drink nothing of a stimulating quality.

Certainly, if the bleeding should prove troublesome, and proceed from vessels within the rectum, the best plan would be to distend the gut with a suitable piece of sponge, so as to make pressure on the wound, observing to adopt at the same time the means above recommended.

Tying hemorrhoids is free from the danger of hemorrhage; but, still it has its inconveniences, though they are not constant ones. Petit frequently practised this method, without any ill effects. In other instances, he had reason to repent having adopted it. A woman, for whom he had tied three hemorrhoids with narrow pedicles, which were favourably situated for this operation, did not at first experience a great deal of pain. However, five hours afterwards he was informed, that she suffered violent colic pains, which extended along the colon. The woman was bled four times, without relief. At last, Petit cut the ligatures, which could not be loosened, in consequence of their being concealed so deeply in the substance of the swollen parts. The pain very soon subsided. The ligatures had only been applied four and twenty hours, but the piles had become black, and the skin covering their bases was cut through. Petit removed them, without the least effusion of blood.

M. Petit also relates a case, in which a patient, after having some piles tied, died of symptoms resembling those, which take place in cases of strangulated herniæ, notwithstanding the ligatures were cut as in the foregoing instance. After these two cases, Petit abandoned the plan of curing hemorrhoids by tying them.

I believe, on the whole, that it is best to remove hemorrhoids with a knife, unless they are situated high up the rectum, where the veins are of large size, and likely to bleed profusely. If a tumour so situated should absolutely require removal, a ligature might be put round its base with the aid of a double cannula, in the way we shall relate in speaking of *Polypi*. When the base of the tumour, however, is large, admits of being brought into view, and the surgeon prefers tying it, he should pass a needle, armed with a strong double ligature, through the root of the hemorrhoid, and tie one part of this ligature firmly over one side of the swelling, and the other over the opposite one. When the base of the tumour is narrow, and the ligature is preferred, the part may be tied at once, without passing a double ligature through its middle.

As piles very seldom prove fatal, an opinion has commonly prevailed, that they are of a salutary, or critical nature. They have not unfrequently been regarded, as an evacuation, by which some peccant, or morbific matter, is thrown off from the body; and hence, patients have frequently been taught to submit to all the pain, and uneasiness, which the disease occasions, rather than seek a cure. This opinion, however, is neither founded upon impartial and mature observation, nor upon solid reasoning; for, granting that there was any morbific matter in the body, it is impossible to explain why it should be collected in the blood, which fills the dilated veins about the rectum, more than any where else.

For information on hemorrhoids, consult *L'Encyclopédie Méthodique; Partie Chirurgicale. Sabatier, De la Médecine Opératoire, Tom.* 2. *Latta's System of Surgery, Vol.* 2. *Ware on the Treatment of Hemorrhoids. Abernethy on Hemorrhoidal Diseases in his Surgical Works, Vol.* 2, *p.* 231, *&c.*

HE'RNIA. (from ἔρνος, a branch, from its protruding forward.) Surgeons understand by the term *hernia*, a tumour, formed by the protrusion of some of the viscera of the abdomen, out of that cavity, into a kind of sac, composed of the portion of peritoneum, which is pushed before them. However, there are cer-

tainly some cases which will not be comprehended in this definition; either because the parts are not protruded at all, or have no hernial sac, as the reader will learn in the course of this article.

GENERAL REMARKS ON HERNIÆ.

"The brilliant progress, which surgery has made in modern times (says Scarpa) is, properly speaking, only the results of pathological anatomy, that is to say, of exact comparisons of the natural state of our organs with their different diseases, which may depend upon an alteration of texture, a derangement of functions, a solution of continuity, or a change of situation. It is from these important results, that the most rational curative methods, with which modern surgery is enriched, are deduced as so many corollaries; methods, to which we are also indebted for the perfection of operations.

"There are indeed a certain number of surgical operations, for the prompt and safe execution of which, mere anatomical knowledge will suffice; but, in many others, the surgeon cannot promise himself success, even though he be well acquainted with anatomy, unless he has particularly studied the numerous changes of position, and alterations of texture, of which the parts, upon which he is about to operate, are susceptible. If he has not the requisite information upon all these points, false appearances may deceive his judgment, and make him commit mistakes, sometimes of a very serious and irreparable kind.

"In order to have a convincing proof of this truth, it will be sufficient to take a view of the different species of herniæ, and their numerous complications. Assuredly, no anatomist would believe, that the intestine cæcum, naturally fixed in the right ilium, and the urinary bladder, situated at the bottom of the pelvis, could undergo, without being torn, so considerable a displacement as to protrude through the abdominal ring, and descend even into the scrotum; that the same intestine the cæcum could pass from the right iliac region to the umbilicus, so as to protrude at this opening, and form an umbilical hernia; that the right colon could have been seen protruding from the abdomen at the left abdominal ring, and the left colon through the right one; that the liver, the spleen, and ovary could sometimes be the parts contained in the umbilical, inguinal, and femoral herniæ; that the cæcum could engage itself within the colon, and even protrude at the anus; that the stomach, forced through the diaphragm, could form a hernia within the chest; that the omentum, or intestine, or both these parts together, could sometimes make their escape from the belly through the foramen ovale, or sacro-ischiatic notch, of the pelvis; that a noose of small intestine, after being engaged in the abdominal ring, or under the femoral arch, could suffer the most violent strangulation, without the course of the intestinal matter being intercepted; lastly, that, in certain circumstances, the intestine and omentum could be in immediate contact with the testicle, within the tunica vaginalis, without the least laceration of this latter membrane. These and several other analogous facts, says Scarpa, are so surprising, that they would yet be regarded as incredible, had they not been proved by numerous observations on individuals affected with hernia: their possibility, (repeats this experienced professor) would not even have been suspected either by the anatomist, or physiologist." (See *Scarpa's Traité des Hernies, Pref.*)

CAUSES OF HERNIÆ.

The places, in which these swellings most frequently make their appearance, are the groin, the navel, the labia pudendi, and the upper and forepart of the thigh; they do also occur at every point of the anterior part of the abdomen; and there are several less common instances, in which hernial tumours present themselves at the foramen ovale in the perinæum, in the vagina, at the ischiatic notch, &c. These rarer species of hernia will be noticed in their proper place.

The parts, which, by being thrust forth from the cavity, in which they ought naturally to remain, mostly produce herniæ, are either a portion of the omentum, or a part of the intestinal canal, or both together. But, the stomach, the liver, spleen, uterus, ovaries, bladder, &c. have been known to form the contents of some hernial tumours.

From these two circumstances of situation and contents, are derived all the different appellations, by which herniæ are distinguished. If a portion of intestine only forms the contents of the tumour, it is called *enterocele;* if a piece of omentum only, *epiplocele;* and if both intestine and omentum contribute mutually to the formation of a tumour, it is called *entero-epiplocele.* When the contents of a hernia are protruded at the abdominal ring, but only pass as low as the groin, or labium pudendi, the case receives the name of *bubonocele,* or *inguinal hernia;* when the parts decend into the scrotum, it is called an *oscheocele,* or *scrotal hernia.* The *crural,* or *femoral hernia,* is the name given to that which takes place below Poupart's ligament. When the bowels protrude at

the navel, the case is named an *exomphalos*, or *umbilical hernia*; and *ventral* is the epithet given to the swelling, when it occurs at any other promiscuous part of the front of the abdomen. The *congenital rupture* is a very particular case, in which the protruded viscera are not covered with a common hernial sac of peritoneum, but are lodged in the cavity of the tunica vaginalis, in contact with the testicle, and, as must be obvious, it is not named, like herniæ in general, from its situation, or contents, but from the circumstance of its existing from the time of birth.

When the hernial contents lie quietly in the sac, and admit of being readily put back into the abdomen, it is termed a *reducible hernia*; and, when they suffer no constriction, yet cannot be put back, owing to adhesions, or their large size in relation to the aperture, through which they have to pass, the hernia is termed *irreducible*. An *incarcerated*, or *strangulated hernia*, signifies one, which not only cannot be reduced, but suffers constriction; so that, if a piece of intestine be protruded, the pressure, to which it is subjected, stops the passage of its contents onward towards the anus, makes the bowel inflame, and brings on a train of most alarming, and often fatal consequences.

The causes of herniæ are either *predisposing* or *exciting*. Of the former kind, writers mention a preternaturally large size of the openings, at which the bowels protrude; a weakness and relaxation of the margins of these apertures; a preternatural laxity of the peritonæum; an unusually long mesentery, or omentum, &c. It is very certain, that, with regard to the abdominal ring, the transverse tendinous fibres, which naturally cross and strengthen its upper and outer part, are much weaker in some subjects than others. No idea seems more prevalent in books, than, that taking a good deal of oil with one's food, is conducive to the occurrence of ruptures. Some of the alleged pre-disposing causes, may justly excite scepticism; but there are several circumstances which tend to prove, that a natural deficiency of resistance, in any part of the parietes of the abdomen, is certainly a cause of this kind. We need only mention, how very liable persons are, who have had the peritonæum wounded, to the present disease; and how much more liable men are than women to the inguinal hernia, owing evidently to the larger size of the abdominal ring in the former, than the latter subjects. These, however, having a larger space for the protrusion of the viscera, below Poupart's ligament, are more exposed than men to femoral herniæ.

With regard to the *exciting* causes, our knowledge is involved in less doubt. The grand cause of this kind, is the powerful action of the abdominal muscles and diaphragm on the viscera. In feats of agility, such as jumping, &c. the pressure which the contents of the abdomen must often encounter, sufficiently accounts for their protruding at any part, where the abdominal parietes do not make adequate resistance. The same consideration explains, why herniæ very often take place in lifting and carrying heavy weights, running, vomiting, straining at stool, parturition, &c. and in people who inhabit mountainous countries.

This diminution of the capacity of the abdomen, by the action of the abdominal muscles and diaphragm, on many occasional exertions, must take place in every one, by reason of the common habits and necessities of life. But, as only a certain number of persons meet with the disease, it is fair to infer, that, either the exciting causes must operate with greater force in them than in the generality of people, or else their abdominal parietes have not been capable of the ordinary degree of resistance. Many patients who meet with herniæ, in making violent efforts and exertions, may be in the former circumstance; while others, who have their viscera protruded from such trivial things as coughing, sneezing, crying, &c. must be considered as being under the influence of some predisposing cause. A gentleman, who has gained great honour by a late publication on hernia, remarks, that, "herniæ, which originate in predisposition, generally come on gradually, and almost imperceptibly; while those which are produced by bodily exertion, are formed suddenly, and by the immediate action of the exciting cause. The occurrence of the complaint is often indicated, in the first instance, by a fulness, combined with a sense of weakness, about the abdominal ring. The swelling is increased by any action of the respiratory muscles, and disappears on pressure, and in the recumbent position of the body. It gradually finds its way through the tendon of the external oblique muscle, into the groin, and afterwards into the scrotum. When a hernia takes place suddenly, it is generally attended with a sensation of something giving way at the part, and with pain." (*Lawrence on Hernia*; 1807; *p.* 11.)

Upon the subject of the immediate cause of herniæ, it is observed by Scarpa, that several of the most celebrated modern surgeons, as, for instance, Warton, (*Adenograph. cap.* 11). Benevoli, (*Dissertazioni Chirurgiche*, 1). Rossius, (*Acta Nat. cur, Tom.* 2, *Obs.* 178), Brendel (*de herniarum natalibus*) and Morgagni, (*de sed. et*

caus. morb. epist. 43, *art.* 13), consider a relaxation and elongation of the mesentery, as the principal cause of herniæ in general, and of the bubonocele in particular. Hence it happens, say they, that the whole mass of intestines, or only a portion of an intestine, descends against the inner orifice of the inguinal ring, comes into contact with this opening, and gradually makes its way out of the abdomen. In examining this pathological point without prejudice, it is incontestable, says Scarpa, that an intestine cannot be moved beyond its natural limits, unless that part of the mesentery, which retains and fixes the bowel in its proper place, be at the same time elongated. But, it does not follow from this, that a relaxation of the mesentery must precede the displacement of the intestine. It appears to Scarpa much more probable, that these two events are simultaneous, and depend upon one and the same cause.

"In the healthy state, (observes this interesting writer) the abdomen, considered altogether, is submitted to two opposite forces, which reciprocally balance each other. One is the pressure of the viscera against the abdominal parietes; the other is the reaction of these same parietes upon the viscera, which they contain. If these two forces were in perfect equilibrium in all individuals, and under all the circumstances of life, we should not be in the least subject to herniæ. If, when the equilibrium has been broken, every point of the parietes of the belly were to yield equally to the impulse of the viscera, an increase of the volume of the whole abdomen would be the consequence; but, a true hernia would never happen. The cavity of the abdomen is always completely full. The containing and contained parts react upon, and reciprocally compress one another. It is by the effect of this moderate, but equal and unremitting pressure, that all the viscera mutually support each other. Without it, the ligaments of the liver, those of the spleen, and the various membranous bands of the intestines in general, would only be feeble means for fixing such parts in their respective situations. But, there are certain points of the abdominal parietes, which naturally present much less resistance, than others, and which react with much less power against the pressure made from within outwards by the abdominal viscera. Such is particularly the part, which extends from the pubes to the anterior superior spinous process of the ilium. This relative weakness of some points of the abdominal parietes is very marked in certain individuals, in consequence of a defect of organization. It may also be increased by internal or external causes, which are as various as they are numerous. When, in one of these cases, the pressure made by the viscera is unusually increased, as happens in a violent effort, a defect in the equilibrium between the two forces above mentioned is occasioned; that is to say, the reaction of the abdominal parietes is no longer proportioned, at least at certain points, to the force of the impulse of the viscera. The conjoined powers of the abdominal muscles, diaphragm, and levator ani, are then directed and concentrated against the most feeble point of the abdomen, towards which they propel the nearest viscus, or that, which, from its moveableness, is the most liable to displacement. If such viscus should happen to be the noose of an intestine, it is evident, that the power, which tends to make it protrude from the belly, must at the same time act upon the corresponding portion of the mesentery; and the intestine, in passing through the parietes of the abdomen, drags the mesentery after it, and makes this membrane yield and become elongated. When the displaced viscera meet with little resistance on the part of the parietes of the abdomen, the hernia is quickly formed, and the elongation of the mesentery occurs with equal celerity. We have an example of this in the inguinal congenital hernia: in this case, the intestine is, in some measure, precipitated into a sac previously prepared for its reception. On the contrary, in the ordinary inguinal hernia, a totally different disposition of the parts renders the progress of the disease much slower. In most instances, the hernia is not formed immediately the equilibrium between the impulse of the viscera and the reaction of the abdominal parietes, is broken. But in the groin, a slight elevation is first observed, which reaches from the anterior superior spinous process of the ilium to the inguinal ring. Some time afterwards, when the intestine has made its appearance on the outside of the ring, the enlargement of the hernia, and the elongation of the mesentery, make much more rapid, though always simultaneous progress.

"Numerous practical observations, (says Scarpa) concur in proving the foregoing account, that we must not search for the immediate cause of herniæ in the relaxation of the mesentery, but rather in a want of equilibrium between the pressure of the viscera and the resistance of one or several points of the abdominal parietes. Indeed, herniæ are seen occurring from the slightest causes in infants, in whom the neck of the tunica vaginalis is not speedily obliterated, and in individuals, who, from being fat have all on a

sudden become extremely thin. Such women as have had children, are more subject to the disease than others. Persons also of both sexes, who carry considerable burdens, or who play upon wind instruments, or who have suffered a forcible contusion of the abdomen, are particularly exposed to the disorder, even though there is not the least reason for suspecting in them a relaxation of the mesentery. Vaginal herniæ, which arise after difficult labours, afford another proof of the same truth: their cause is owing to a laxity and weakness of the parietes of the vagina, which, not being capable of making any further resistance to the pressure of the viscera situated in the cavity of the pelvis, at length suffer these parts to protrude.

"With respect to the second proposition, that during the formation of a hernia, the combined force of all the abdominal muscles is, as it were, directed and concentrated against the most feeble point of the parietes, we see a proof of it in a fact that occurs to our observation every day. In order to convince ourselves of this, it is enough to notice the individuals afflicted with herniæ: if they cough, or sneeze; in a word, if they make the slightest effort, they instantly find the size of the swelling increased, and hasten to support the part with their hand. During the slightest shocks, which render the herniæ larger, it is also indisputable, that the mesentery is elongated in the same proportion as the intestine protrudes. All the viscera have such a tendency to be displaced and carried towards the weakest point of the parietes of the abdomen, that even those, which are naturally the most distant from it, and are the most firmly fixed by the folds of the mesentery, may in their turn descend into the herniæ. Anatomical knowledge alone would never have led us to have a suspicion of the possibility of these occurrences. Sandifort and Paletta have found, in an umbilical hernia, the cæcum, with a portion of the ilium and colon. (*Obs. Pathol. cap.* 4, *& Nova Gubernaculi testis Descriptio.*) Mauchart, Camper, and Bose, have met with the cæcum in an inguinal hernia of the left side. (*De Hern. Incarc. in Halleri Disput. Chirurg. Tom.* 3. *Demonstrat. anat. patholog. lib.* 2, *p.* 18, *& Animadvers. de hern. inguin. p.* 5.) Lassus has seen the left colon protrude at the right inguinal ring. (*Médecine Opératoire, Tom.* 1, *p.* 173.) If it be proved by all these facts, that such viscera, as are the most closely united to the great sac of the peritoneum and neighbouring parts, are nevertheless liable to form herniæ; and if such displacements cannot happen without a considerable elongation of the membranous bands fixing these bowels in their natural situation, how can we refuse to admit, that a noose of intestine, pushed by degrees through the inguinal ring, drags along with it the corresponding portion of the mesentery? In order to explain this event, there is no necessity for supposing a partial relaxation of the mesentery." (*Traité Pratique des Hernies, Par A. Scarpa, trad. de l'Italien, p.* 37—43.)

The general symptoms of a hernia, which is reducible, and free from strangulation, are; an indolent tumour at some point of the parietes of the abdomen; most frequently descending out of the abdominal ring, or from just below Poupart's ligament, or else out of the navel; but, occasionally, from various other situations, as will be presently explained. The swelling often originates suddenly, except in the circumstances above related, and, it is subject to a change of size, being smaller when the patient lies down on his back, and larger when he stands up, or holds his breath. The tumour frequently diminishes when pressed, and grows large again when the pressure is removed. Its size and tension often increase after a meal, or when the patient is flatulent. Patients with hernia, are apt to be troubled with colic, constipation, and vomiting, in consequence of the unnatural situation of the bowels. Very often, however, the functions of the viscera seem to suffer little or no interruption.

If the case be an *enterocele*, and the portion of intestine be small, the tumour is small in proportion; but, though small, yet, if the gut be distended with wind, inflamed, or have any degree of stricture made on it, it will be tense, resist the impression of the finger, and give pain upon being handled. On the contrary, if there be no stricture, and the intestine suffers no degree of inflammation, let the prolapsed piece be of what length it may, and the tumour of whatever size, yet the tension will be little, and no pain will attend the handling it; upon the patient's coughing, it will feel as if it were blown into; and, in general, it will be found very easily returnable. (*Pott.*) A guggling noise is often made when the bowel is ascending.

If the hernia be an *epiplocele*, or one of the omental kind, the tumour has a more flabby, and a more unequal feel; it is in general perfectly indolent, is more compressible, and (if in the scrotum) is more oblong, and less round, than the swelling occasioned in the same situation by an intestinal hernia; and, if the quantity be large, and the patient adult, it is, in some measure distinguishable by its greater weight. (*Pott.*)

If the case be an *entero-epiplocele*, that is, one consisting of both intestine and omentum, the characteristic marks will

be less clear than in either of the simple cases; but the disease may easily be distinguished from every other one, by any body in the habit of making the examination. (*Pott, p.* 28.)

On the subject of prognosis, Mr. Pott remarks, "that the same kind of rupture, in different people, and under different circumstances, wears a very various face; the age and constitution of the subject, the date of the disease, its being free, or not free from stricture, or inflammation, the symptoms which attend it, and the probability or improbability of its being returnable, necessarily producing much variety; the degree of hazard attending this complaint will be also more or less, as it shall happen to be circumstanced.

"If the subject be an infant, the case is not often attended with much difficulty, or hazard; the softness and ductility of their fibres generally rendering the reduction easy as well as the descent; and though from neglect, or inattention, it may fall down again, yet it is as easily replaced, and seldom produces any mischief: I say seldom, because I have seen an infant, one year old, die of a strangulated hernia, which had not been down two days, with all the symptoms of mortified intestines.

"If the patient be adult, and in the vigour of life, the consequences of neglect, or of mal-treatment, are more to be feared than at any other time, for reasons too obvious to need relating. The great and principal mischief to be apprehended, in an intestinal hernia, is an inflammation of the gut, and an obstruction to the passage of the aliment and feces through it; which inflammation and obstruction are generally produced by a stricture made on the intestine. In very old people, the symptoms do not usually make such rapid progress, both on account of the laxity of their frame, and their more languid circulation; and also that their ruptures are most frequently of ancient date, and the passage a good deal dilated; but then, on the other hand, it should also be remembered, that they are by no means exempt from inflammatory symptoms; and that, if such should come on, the infirmity of old age is no favourable circumstance in the treatment, which may become necessary.

"If the disease be recent, and the patient young, immediate reduction, and constant care to prevent its pushing out again, are the only means whereby it is possible to obtain a perfect cure.

"If the disease be of long standing, has been neglected, or suffered to be frequently down, and has given little or no trouble, the aperture in the abdominal muscle, and the neck of the hernial sac, may both be presumed to be large; which circumstances in general render immediate reduction less necessary and less difficult, and also frustrate all rational expectation of a perfect cure. On the contrary, if the rupture be recent, or, though old, has generally been kept up, its immediate reduction is more absolutely necessary, as the risk of stricture is greater from the supposed smallness of the aperture, and narrowness of the neck of the sac. If the rupture be very large and ancient, the patient far advanced in life, the intestine not bound by any degree of stricture, but does its office in the scrotum regularly, and no other inconvenience be found to attend it, but what proceeds from its weight, it will in general be better not to attempt reduction, as it will, in these circumstances, most probably prove fruitless, and the handling the parts in the attempt, may so bruise and injure them as to do mischief; but this must be understood to be spoken of those only in which there is not the smallest degree of stricture, nor any symptom of obstruction in the intestine; such circumstances making reduction necessary at all times, and in every case.

"With regard to the contents of a hernia, if it be a portion of omentum only, and has been gradually formed, it seldom occasions any bad symptoms, though its weight will sometimes render it very troublesome. But if it be produced suddenly, by effort or violence, that is, if a considerable piece of the caul by accident slip down at once, it will sometimes prove painful, and cause very disagreeable complaints; the connexion between the omentum, stomach, duodenum, &c. being such as to render the sudden descent of a large piece of the first sometimes productive of nausea, vomiting, colic, and all the disagreeable symptoms arising from the derangement of these viscera. When the piece of caul is engaged in such a degree of stricture as to prevent the circulation of blood through it, it will sometimes, by becoming gangrenous, be the occasion of very bad symptoms, and even of death, as I have more than once seen: and thus, as a mere omental hernia, it may sometimes be subject to great hazard. But even though it should never be liable to the just mentioned evil, that is, though the portion of the caul should remain uninjured in the scrotum, yet it renders the patient constantly liable to hazard from another quarter; it makes it every moment possible for a piece of intestine to slip into the same sac, and thereby add to the case all the trouble and all the danger arising from an intestinal rupture. It is by no means an uncommon thing for a

piece of gut to be added to a rupture, which had for many years been merely omental, and for that piece to be strangulated, and require immediate help.

"An old omental hernia is often rendered not reducible, more by an alteration made in the state of the prolapsed piece of caul, than by its quantity. It is very common for that part of the omentum which passes through the neck of the sac, to be compressed into a hard, smooth body, and lose all appearance of caul, while what is below in the scrotum is loose and expanded, and enjoys its natural texture; in this case, reduction is often impossible, from the mere figure of the part; and I have so often seen this, both in the living and the dead, that I am satisfied, that for one omental rupture, rendered irreducible by adhesions, many more become so from the cause abovementioned.

"In the sac of old omental ruptures that have been long down, and only suspended by a bag truss, it is no very uncommon thing to have a pretty considerable quantity of fluid collected: this, in different states and circumstances of the disease, is of different colour and consistence, and seldom so much in quantity as to occasion any particular attention to it; but on the other hand, it sometimes is so much in quantity as to become an additional disease to the original one. I have more than once been obliged to let it out, in order to remove the inconvenience arising from its weight, and the distention of the scrotum, which I have also seen become gangrenous by the neglect of this operation.

"If the hernia be of the intestinal kind, merely, and the portion of gut be small, the risk is greater, strangulation being more likely to happen in this case, and more productive of mischief, when it has happened: for the smaller the portion of gut is which is engaged, the tighter the tendon binds, and the more hazardous is the consequence. I have seen a fatal gangrene, in a bubonocele, which had not been formed forty-eight hours, and in which the piece of intestine was little more than half an inch. There are few practitioners, who have seen business, but know the truth of this; but perhaps the reason of it is not sufficiently explained to the unknowing: it is this; when a considerable portion of intestine passes out from the belly in a hernial sac, it necessarily and unavoidably carries with it a proportional quantity of the mesentery, which every body knows is a strong double membrane. When the prolapsed part is at all considerable, this double membrane is again in some measure folded on itself, and takes off a good deal of the effect of the stricture on the intestine. Now although this circumstance will not prevent the effect, if the means of relief be totally neglected, yet it will most certainly retard the evil, and give more time for assistance; whereas, when there is little or none of the mesentery got through the tendon, and the thin, tender intestine bears all the force of the stricture, it is immediately brought into hazard.

"The practical inference to be drawn from hence, is too obvious to need mentioning.

"In the intestinal, as in the omental hernia, they which have been often or long down, are in general more easily returned, and do not require such immediate assistance, as they which have seldom been down, or have recently descended; and in the one kind of hernia, as well as in the other, the state of the hernial sac, with regard to size, thickness, &c. depends very much on the date of the disease, and the regard that has been paid to it.

"If the hernia be caused by a portion of the intestine ileum only, it is in general more easily reducible than if a part of the colon has descended with it, which will also require more address and more patience in the attempt. The reduction of a mere intestinal hernia too (*cæteris paribus*) will always remain more practicable than that of a mere omental one, after it has attained to a certain size and state, as the part contained within the former is liable to less alteration of form than that within the latter; which alteration has already been mentioned as no infrequent hindrance of the return of an old caul rupture.

"Not that the parts within a mere intestinal hernia are absolutely exempt from such an alteration as may render their return into the belly impracticable, even where there is no stricture; for I have seen that part of the mesentery, which has lain long in the neck of the sac of an old rupture, so considerably hardened and thickened, as to prove an insuperable obstacle to its reduction.

"Upon the whole, every thing considered, I think it may be said, that an intestinal rupture is subject to worse symptoms, and a greater degree of hazard, than an omental one, though the latter is, by no means, so void of either as it is commonly supposed to be; that bad symptoms are more likely to attend a recent rupture than one of ancient date; that the descent of a very small piece of intestine is more hazardous than that of a larger: that the hernia, which consists of gut only, is in general, attended with worse circumstances than that which is

made up both of gut and caul; and that no true judgment can be formed of any rupture at all, unless every circumstance relating to it be taken into consideration." (*Pott on Ruptures.*)

Mr. Hey coincides with Pott, in thinking the prognosis more unfavourable when the tumour is small. "I think it is not a bad general rule, that the smaller the hernia, the less hope there is of reducing it by the taxis. Long-continued efforts to reduce a prolapsed intestine, are most likely to succeed in old and large hernias, when no adhesions have taken place." (*Pract. Observ. in Surgery, p.* 203.)

"The opening (says Mr. Lawrence) through which the parts protrude, is narrower in some situations than in others; the progress of the case will therefore be more rapid, and the danger of the patient more urgent. The aperture is generally very small in femoral hernia; this kind of rupture in men, and the bubonocele in women, have a particularly narrow entrance." (*Treatise on Hernia, p.* 29)

GENERAL OBSERVATIONS ON THE TREATMENT OF HERNIÆ.

1. *Treatment of those which are capable of easy and immediate reduction, and are not attended by any troublesome or bad symptoms.*

"This case," says Pott, "is very frequently met with in infants, and sometimes in adults, and is too often neglected in both. In the former, as the descent seldom happens but when the infant strains to cry, and the gut is either easily put up, or returns *suâ sponte*, as soon as the child becomes quiet, it often is either totally unattended to, or an attempt made to restrain it only by a bandage made of cloth, or dimity, and which being ineffectual for such purpose, lays the foundation for future trouble and mischief.

"This is, in great measure, owing to a common opinion, that a young infant cannot wear a steel truss: a generally prevailing error, and which ought to be corrected. There is no age at which such truss may not be worn, or ought not to be applied; it is, when well made, and properly put on, not only perfectly safe and easy, but the only kind of bandage that can be depended upon: and as a radical cure depends greatly on the thinness of the hernial sac, and its being capable of being so compressed as possibly to unite, and thereby entirely close the passage from the belly, it must therefore appear to every one who will give himself the trouble of thinking on the subject, that the fewer times the parts have made a descent, and the smaller and finer the elongation of the peritoneum is, the greater the probability of such cure must be.

"The same method of acting must, for the same reasons, be good in every age in which a radical cure may reasonably be expected; that is, the prolapsed parts cannot be too soon returned, nor too carefully prevented from falling down again, every new descent rendering a cure both more distant and more uncertain.

"As soon as the parts are returned, the truss should be immediately put on, and worn without remission, care being taken, especially if the patient be an infant, to keep the parts on which it presses constantly washed, to prevent galling.

"It can hardly be necessary to say, that the surgeon should be careful to see that the truss fits, as his success and reputation depend on such care. A truss which does not press enough, is worse than none at all, as it occasions loss of time, and deceives the patient, or his friends; and one which presses too much, or on an improper part, gives pain and trouble, by producing an inflammation and swelling of the spermatic chord, and sometimes of the testicle.

"In adults, whose ruptures are of long standing, and accustomed to frequent descent, the hernial sac is generally firm and thick, and the aperture in the tendon of the abdominal muscle large; the freedom and ease with which the parts return into the belly, when the patient is in a supine posture, and the little pain which attends a rupture of this kind, often render the persons who labour under it careless: but all such should be informed, that they are in constant danger of such alteration in their complaint, as may put them into great hazard, and perhaps destroy them. The passage from the belly being open, the quantity of intestine in the hernial sac is always liable to be increased, and when down, to be bound by a stricture. An inflammation of that portion of the gut which is down, or such obstruction in it as may distend and enlarge it, may at all times produce such complaints as may put the life of the patient into imminent danger; and therefore, notwithstanding this kind of hernia may have been borne for a great length of time, without having proved either troublesome or hazardous, yet as it is always possible to become so, and that very suddenly, it can never be prudent or safe to neglect it.

"Even though the rupture should be of the omental kind, (which considered abstractedly is not subject to that degree or kind of danger to which the intestinal is liable) yet it may be secondarily, or by accident, the cause of all the

same mischief; for while it keeps the mouth of the hernial sac open, it renders the descent of a piece of intestine always possible, and consequently always likely to produce the mischief which may proceed from thence.

"They who labour under a hernia thus circumstanced, that is, whose ruptures have been generally down while they have been in an erect posture, and which have either gone up of themselves, or have been easily put up in a supine one, should be particularly careful to have their truss well made, and properly fitted; for the mouth of the sac, and the opening in the tendon being both large and lax, and the parts having been used to descend through them, if the pad of the truss be not placed right, and there be not a due degree of elasticity in the spring, a piece of intestine will, in some posture, slip down behind it, and render the truss productive of that very kind of mischief which it ought to prevent.

"It is scarcely credible how very small an opening will serve for a portion of gut or caul to insinuate themselves into at some times. Now, though in persons of mature age it most frequently proves impracticable so to compress the mouth of the hernial sac, as absolutely to close it, yet by the constant use of a well-made truss, it may be so lessened, as to render the descent of a piece of intestine into it much more difficult: from whence we may learn the great consequence of having the part completely reduced before the truss is applied, and the danger that may be incurred by laying such bandage aside after it has been worn some time; since the same alteration which renders the descent of the gut less easy, will also make the reduction more difficult, if a piece should happen to get down: and hence also we may learn why the bandage should be long and unremittingly worn by all those whose time of life makes the expectations of a perfect cure reasonable, many of the ruptures of adults being owing to the negligent manner in which children at school are suffered to wear their trusses.

"I know a gentleman who has for some years had an omental rupture, which was neglected while he was young, and he having naturally a lax habit, and the abdominal opening being much dilated, he finds it extremely difficult to keep it up, even with the best truss he can get, behind which it will sometimes slip down: when this happens, it gives him such immediate and acute pain at his stomach, and makes him so intolerably sick, that he is obliged immediately to throw himself on his back, and procure the return of the piece of omentum." (*Pott on Ruptures.*)

When we have considered the anatomy of particular herniæ we shall be better able to judge of the proper construction of trusses. (See *Truss.*)

TREATMENT OF IRREDUCIBLE HERNIÆ, FREE FROM INFLAMMATION, AND UNATTENDED WITH TROUBLESOME, OR DANGEROUS SYMPTOMS.

"This incapacity of reduction may be owing to several causes, but most frequently arises either from the largeness of the quantity of the contents, from an alteration made in their form and texture, or from connexions and adhesions, which they have contracted with each other, or with their containing bag.

"I have already mentioned it as my opinion that ruptures are sometimes rendered difficult to be reduced, by that portion of the intestinal canal which is called the cæcum, or the beginning of the colon, being contained in the hernial sac. Of which fact I am as much convinced as the nature of such kind of things will permit; that is, by observations made both on the living and the dead.

"When a hernia of this kind (viz. one containing such a part of the intestinal tube) has been long neglected, and suffered to remain in the scrotum without any bandage at all to support its weight, the hernialtsac being constantly dragged down, and kept in a state of distention, necessarily becomes thick, hard, and tough; by this means the diameter of its neck is lessened, and the return of the intestine back from the scrotum into the belly rendered more and more difficult, as the parts through which it is to pass become harder, and less capable of yielding. This will, indeed, in time prove an obstruction sufficient to hinder any part of the intestine, or even of the omentum, from being returned; but the more the difficulty is, which proceeds from the mere figure and size of the portion of gut, the greater will be the obstruction when added to that arising from the just-mentioned cause.

"An alteration produced by time, and constant, though gentle, pressure in the form and consistence, or texture of the omentum, is also no infrequent cause, why neglected omental ruptures become irreducible.

"The cellular membrane in all parts of the body, however loose and light its natural texture may be, is capable of becoming hard, firm, and compact, by constant pressure. Of this there are so many, and so well known instances, that it is quite unnecessary to produce any.

"The omentum, from its texture, is

liable to the same consequence. When a portion of it has been suffered to remain for a great length of time in the scrotum, without having ever been returned into the belly, it often happens that although that part of it which is in the lower part of the hernial sac preserves its natural soft, adipose, expansile state, yet all that part which passes through what is called the neck of the sac is, by constant pressure, formed into a hard, firm, incompressible, carnous kind of body, incapable of being expanded, and taking the form of the passage in which it is confined, exactly filling that passage, and rendering it impossible to push up the loose part which fills the scrotum.

"This is no theoretic opinion, but a fact, which I have seen and proved often; and whoever will reflect on it, will immediately find in it one insuperable objection to the return of some old omental ruptures.

"The same reason for incapacity of reduction is also sometimes met with in ruptures of the intestinal kind, from an alteration produced on that part of the mesentery which has been suffered to lie quiet for a great length of time in the neck of an old hernial sac.

"The other impediment, which I mentioned, to the return of old ruptures, is the connexion and adhesion of the parts, either with each other, or with the bag containing them. This is common to both the intestinal and omental hernia, and is produced by slight inflammations of the parts, which have been permitted to lie long in contact with each other, or perhaps in many cases from the mere contact only. These adhesions are more or less firm in different cases, but even the slightest will almost always be found an invincible objection to the reduction of the adherent parts, by the hand only.

"Many, or perhaps most of these irreducible ruptures become so by mere time and neglect, and might at first have been returned; but when they are got into this state, they are capable of no relief from surgery but the application of a suspensory bag, to take off or lessen the * inconvenience arising from the weight of the scrotum.

"People in this situation should be particularly careful not to make any attempts beyond their strength, nor aim at feats of agility; they should take care to suspend the loaded scrotum, and to keep it out of the way of all harm from pressure, bruise, &c. When the tumour is very large, a soft quilted bolster should be worn at the bottom of the suspensory to prevent excoriation, and the scrotum should be frequently washed for the same reason; a loss of skin in this part, and in such circumstances, being sometimes of the utmost importance. They ought also to be particularly attentive to the office of the intestinal canal, to see that they do not by any irregularity of diet disorder it, and keep themselves from being costive, for reasons too obvious to need relating. By these means, and with these cautions, many people have passed their lives for many years free from disease, or complaint, with very large irreducible ruptures.

"On the other hand, it is fit that mankind should be apprised, that the quiet, inoffensive state of this kind of hernia is by no means to be depended upon; many things may happen to it, by which it may be so altered, as to become hazardous, and even fatal: an inflammation of that part of the gut which is down, any obstruction to the passage of the aliment or feces through it, a stricture made by the abdominal tendon, either on what has been long down, or on a new portion which may at any time be added to it, are always capable of so altering the state of the case, as to put the life of the patient into danger.

"Indeed the hazard arising from a stricture made on a piece of intestine contained in the sac of an old irreducible hernia, is in one respect greater, than that attending one that has been found at times reducible; since from the nature of the case it will hardly admit of any attempt toward relief, but the operation, and that in these circumstances must necessarily be accompanied with additional difficulty.

"Among the ruptures which have been thought not reducible, and treated as such, there have been some which, upon more judicious and more patient attempts, have been found capable of reduction.

"When this is suspected to be the case, the proper method is by absolute rest, in

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* I am not unaware (says Pott) that most of these are capable of being cured by the operation for the bubonocele, as it is called; but as I should never think of proposing it in any case, in which there are not symptoms, that threaten the life of the patient, so I have not mentioned it in this place as a means of cure. I also am not unapprised what influence a successful operation or two of this sort has had on the unknowing; but I also know, that such accidental successes have emboldened the same operators to commit more than one or two murders, in similar cases; and that, from the prevalence of fashion, some of these rupture-doctors have been largely rewarded, when they ought to have been hanged.

a supine posture, for a considerable length of time, by great abstinence, and the use of evacuants, so to lessen the size of the parts in the hernial sac, as to render them capable of passing back again into the belly." (*Pott on Ruptures.*)

Fabricius Hildanus gives an account of a man, who was radically cured of a rupture, of twenty years' date, by six months' confinement to bed. (*Cent. 5, Obs. 54.*)

Le Dran and Arnaud relate instances of monstrous bubonoceles, which disappeared entirely, after the patients had been long confined to bed, and become much emaciated, by tedious illnesses. Some of the moderns have imitated this operation of nature, and by frequent bleedings, and repeated purges, have sometimes so far reduced the size of the hernia, that it has been returned into the abdomen. Mr. Hey has several times succeeded in this way. (*P.* 219.) But, this practice cannot prove successful, when the viscera adhere to the sac, or to the peritoneum, just within the abdomen. The greatest objection to this method of cure, is the want of an absolute criterion, by which to distinguish, when the parts do, or do not adhere to the hernial sac, and, in advanced years, though one were sure, that the viscera were free from the sac, the possibility of hurting the body by the necessary evacuations, is also another objection. (*Sharp's Critical Enquiry, p. 15.*)

Were the plan to be thought worthy of trial, keeping up a constant pressure on the tumour, by means of a suspensory bandage, made to lace in front, would be proper for promoting the absorption of the thickened parts in the hernial sac. Mr. A. Cooper has reduced such herniæ, after applying ice to them, the good effects of which he imputes to its producing a contraction of the scrotum, which performs the office of a strong and permanent compression of the tumour.

Whenever any attempts of this kind succeed, "a truss should be immediately put on, and worn constantly without remission; for, in these people, the largeness of the abdominal aperture, the thickness of the hernial sac, and the relaxation of the mesentery, make a new descent always to be apprehended, and guarded against." (*Pott.*)

There are instances, however, on record, in which the capacity of the abdomen had become so adapted to the diminished quantity of the viscera, that when the contents of the hernia were reduced, serious complaints arose from their introduction into the belly. Schmucker has met with several such cases, in which he has been obliged to take off the truss. Petit has known the reduction of a hernia of this kind prove fatal, the parts not descending again when the truss was removed, the nausea and vomiting, which arose, continuing, and peritonitis taking place. (*Chirurgische, Wahrnehmungen, Vol. 2, p. 243. Traite des Maladies Chirurgicales, Tom. 2, p. 392.*)

Mr. Pott remarks, that "an omental rupture, which has been so long in the scrotum as to have become irreducible, is very seldom attended with any bad symptoms, considered abstractedly; but, it is constantly capable of being the occasion of an intestinal hernia, and all its consequences; neither is that all, for the omentum, either so altered in form and texture, or so connected as to be incapable of reduction, may by accident inflame, and either become gangrenous, or suppurate, and the occasion of a great deal of trouble." In a few instances, epiploceles produce very bad symptoms indeed, cases of which are to be found in Garengeot, Dionis, &c.

Sometimes, in old cases of entero-epiplocele, the intestine is reducible, but the omentum is not, in which case some have advised keeping up the piece of bowel with a truss, the pad of which must be so contrived as not to press on the omentum. Mr. Pott, however, contends, that this is not often practicable, and, should such a truss be used, he advises its being particularly attended to, lest a small piece of gut slip down, and, being pressed on by the truss, produce fatal mischief.

"Irreducible herniæ must of course be exposed to all the consequences of external injury and violence; hence, various cases are recorded, in which the bowels have been burst by blows, falls, &c." (*Lawrence on Hernia, p. 53.*)

SYMPTOMS AND TREATMENT OF A STRANGULATED, OR AN INCARCERATED, HERNIA.—MEANS TO BE TRIED, BEFORE AN OPERATION.

"Difficulty of reduction (says Pott) may be owing to several causes. The size of the piece of omentum, or the inflamed state of it; the quantity of intestine and mesentery, an inflammation of the gut, or its distention by feces, or wind: or the smallness of the aperture of the tendon, through which the hernia passes. But, to whatever cause it be owing, if the prolapsed body cannot be immediately replaced, and the patient suffers pain, or is prevented thereby from going to stool, it is called an *incarcerated hernia, a strangulated hernia*, or *a hernia with stricture.*

"The symptoms are a swelling in the groin, or scrotum, resisting the impression of the fingers: if the hernia be of the intestinal kind, it is generally painful to the touch, and the pain is increased by

coughing, sneezing, or standing upright. These are the very first symptoms, and, if they are not relieved, are soon followed by others, viz. a sickness at the stomach, a frequent retching, or inclination to vomit, a stoppage of all discharge per anum, attended with a frequent, hard pulse, and some degree of fever."

A patient, thus circumstanced, is in some danger, and demands immediate assistance. A stricture made on the prolapsed part of the gut, by the aperture, through which it passes, is the immediate cause of all the bad symptoms, and of course, the removal of such stricture is the only thing, which can bring relief. This object can only be accomplished by returning the bowel back into the abdomen, or dividing the parts, which form the stricture. The former plan is always the most desirable, when practicable.

We next proceed to notice the various measures to be adopted for the relief of a strangulated hernia, so as to obtain the best chance of doing away the necessity of an operation. After treating of the merits of each plan, a few remarks will be offered on the order in which the means should be put in practice, a subject that has been most lamentably neglected, even by the latest writers on this interesting disease.

Taxis.—This is the term applied to the operation of reducing a hernia with the hand. It is much promoted by the position of the patient's body; Winslow thought it advantageous to have it placed in an inclined plane, and the thighs bent towards the trunk. Mr. A. Cooper advises the same practice, observing, that this posture, by relaxing the fascia of the thigh, relaxes also the aperture, through which the hernia passes. Every degree of tension, and relaxation of the femoral fascia must undoubtedly be attended with a corresponding change in the abdominal ring. But flexion of the thigh, besides relaxing this fascia, also relaxes the abdominal, internal iliac, and psoas muscles. The pressure, which is made on the tumour by the hands of the surgeon, should always be directed upwards and outwards, in cases of inguinal hernia, along the course of the spermatic cord, and Mr. A. Cooper advises it to be continued from a quarter to half an hour. (*On Inguinal and Congenital Hernia.*)

As the femoral hernia passes downwards, and then forwards, the pressure must be directed first backwards, and then upwards. No violence should ever be used, for, besides being unavailing, it must greatly aggravate the inflamed state of the contents of the hernial sac, and, it has even made the intestine burst.—(See *Cooper on Inguinal Hernia, &c. p.* 23.)

Besides bending the thigh, care should also be taken to rotate it inwards, which will have great effect in relaxing the femoral fascia, and tendon of the external oblique muscle. Suspension of the patient over the shoulders of an assistant has been thought to facilitate reduction: "I have tried it often, (says Mr. Hey;) but have not found it to be of such superior efficacy, as some authors have represented." (*P.* 144.)

The return of a piece of intestine is generally preceded by a peculiar noise, caused by the passage of air through the stricture. It recedes at first gradually, and then slips up suddenly. The omentum goes up slowly to the very last portion, which must be actually pushed through the opening. If the taxis should not succeed at first, it will often do so after the warm bath, bleeding, or cold applications. Small herniæ, being attended with the closest stricture, are the most difficult to reduce, and, for the same reason; crural ones do not so often yield to the taxis, as inguinal ones in the male subject. The taxis becomes less likely to succeed, the longer the inflamed viscera have been down, because adhesions are likely to have formed. Mr. Lawrence observes, (*p.* 63.) "When the rupture becomes painful, we are no longer justified in persevering in attempts at reduction by the hand. A sufficient pressure cannot now be endured; and the force which is employed only tends to increase the inflammation, and accelerate the approach of gangrene. *At this period, the operation is required, and should be performed without delay.*" Desault even proscribed the taxis altogether in the inflammatory strangulation, until the previous use of other means had produced a change in the state of the swelling. However, I should never advise the reader to lose too much time in this way, on the supposition, that he can diminish the inflammation of a strangulated hernia in any other way, than by delivering the bowels from the pressure of the stricture. Bleeding may check, but cannot stop, much less diminish, the inflammation, that prevails.

That, however, the taxis is frequently abused, and the cause of serious mischief, is a truth, which cannot be doubted. "Strangulated herniæ, (says Scarpa) very frequently mortify from the negligence of the patients, and their repugnance to submit to an operation, and, perhaps, still more frequently from the effect of the taxis, unskilfully exercised by uninformed surgeons, who are determined, at any price whatsoever, to accomplish the speedy reduction of the viscera. The majority of them make no distinction between the *acute*, and the *chronic* strangulation. In both cases, no

sooner are the symptoms of strangulation evinced, than they begin to handle the swelling roughly, and to push the viscera with all their force, in order to make them return into the abdomen; whilst, when the strangulation is *acute*, and the patient young and strong, the taxis ought never to be practised, before all the means proper for diminishing the strength, calming spasm, and relaxing parts, which are to be reduced, have been employed for a certain time. These means, we know, are bleedings, fomentations, emollient glysters, and, especially, the warm bath, which, next to bleeding, holds the first rank. At this school of surgery, I have frequently had opportunities of observing the salutary effect of this treatment. My pupils have, more than once, seen herniæ, which had been painfully handled without any good, reduced, as it were, spontaneously, after a bleeding, or whilst the patient was in the bath. If, what I have said upon the subject of the *acute* strangulation, and the treatment that it requires, were generally known by surgeons, I think, that the operations for strangulated herniæ would be less frequent. Things are different, with regard to the *chronic* strangulation of old large herniæ, in feeble, or aged persons; for, in these cases, it is of great importance to support the patient's strength. Bleedings, the warm bath, and other weakening means, should also be avoided, which, in producing a general atony, might bring on gangrene of the intestine, either during the strangulation, or after the reduction of the viscera. It is ascertained, that these kinds of strangulation are almost always occasioned by an accumulation of fecal matter, or an extraordinary quantity of air in the hernia. Nothing is more efficacious, than cold applications, for provoking the action of the bowel on the matter, which distends it, or for lessening the volume of the air. They produce a corrugation of all the scrotum, and contractions of the cremaster, which alone sometimes suffice for reducing the viscera, in a much better manner, than could be done by the hands of the most experienced surgeon." (*Scarpa, Traité des Hernies, p.* 244—247.)

Bleeding.—The inflammation, which attacks the protruded viscera, and spreads thence over the whole abdomen, and the temporary weakness and often fainting, which the sudden loss of blood induces, and which is a peculiarly favourable opportunity for reducing the hernia by the hand, are the reasons in favour of bleeding in the present disease. Sharp, Pott, B. Bell, Sabatier, Richter, Callisen, and Scarpa, names which can never be surpassed in respectability, are all subscribed in favour of bleeding. Wilmer, Alanson, and A. Cooper, have published against the practice. Mr. Hey has related two cases, which strongly evince the manner, in which bleeding facilitates the return of a hernia: the protruded viscera, in one instance, went up spontaneously, on blood being taken away; in the other, the taxis succeeded immediately afterwards, though the attempt before had been made in vain. (*P.* 125, 126.) Mr. Hey's experience, however, leads him to concur so far with Wilmer and Alanson, as to declare, that bleeding has generally failed to procure a reduction of the strangulated intestine, though he is persuaded that, in many cases, it may be used with advantage. But he cannot agree with Wilmer, that it generally renders the subsequent operation more dangerous. (*P.* 126.)—The majority of candid practitioners, I believe, will allow, that bleeding is always proper, when the hernia is small and recent; the abdomen tense and painful; and the patient young, strong, and plethoric.

Purgative Medicines.—My experience, (says Mr. Hey) leads me to condemn almost universally the use of purgatives taken by the mouth, while an intestine remains firmly strangulated. In the entero-epiplocele, when the intestine has retired, and the omentum remains strangulated; or in a simple strangulation of the omentum, where the intestine has not been prolapsed, purgatives are of great utility. So likewise in very large and old hernias, where there is reason to doubt, whether the disease is not to be considered as a morbid affection of the intestinal canal, rather than the effect of strangulation, purgatives may be as useful as in the simple ileus without hernia. While the intestine remains firmly strangulated, they usually increase the vomiting, and add to the distress of the patient. If they are to be tried at any time with hope of success, the trial would appear to have the greatest advantage when the vomiting has been removed by means of an opiate; yet I have repeatedly given them in vain during such an interval of relief." (*Practical Observations in Surgery, p.* 128.)

Purgatives are supposed to operate by exciting the peristaltic action of the intestine, and thereby extricating it from the stricture. Besides the above eminent surgeon, Pott and Richter have joined in their condemnation in general, and, to all appearances, with very great reason. Purgative glysters, certainly have not the objection of increasing the irritation; but, their efficacy is not deserving of much confidence. Mr. Hey says, he has never seen one case, in which either purgative, or emollient glysters produced a return of a strangulated hernia. Such injections will empty the large intestines; but, they

have seemed to him to do no more. It is common also for a natural evacuation to be the immediate consequence of a strangulation. (*P.* 131.)

Warm Bath.—"Many instances (says Hey) are upon record of the good effect of warm bathing in procuring the reduction of a strangulated hernia. I have often seen it useful; but I have also often seen it fail of success. Whenever it is used in this disease, the patient should be placed, if possible, in a horizontal position. Gentle efforts with the hand to reduce the prolapsed part are perhaps attended with less danger, and with greater prospect of success, while the patient lies in the bath, than in any other position. The free use of opiates coincides with that of warm bathing, and under some circumstances, these means deserve to be tried in conjunction." (*P.* 132.)

Cold Bath, and Cold Applications.—The cold bath, and dashing of cold water on the patient are little to be depended upon, though success seems sometimes to have been obtained in this manner. (*Petit Traité des Mal. Chir. Tom.* 2, *p.* 325, *Hey, p.* 136.)

Wilmer has strongly recommended the application of cold to the tumour itself, and this plan has acquired the approbation of the most celebrated modern surgeons. It is generally tried in conjunction with the effect of tobacco glysters, which will be presently noticed. Cold applications, in the form of ice, were, indeed, particularly recommended by B. Bell. The best way is to pound the ice, tie it up in a bladder, and place it on the rupture. When ice cannot be procured, Mr. A. Cooper employs a mixture of equal parts of nitre and sal-ammoniac. To one pint of water, in a bladder, ten ounces of the mixed salts are to be added. "If, after four hours, (says this distinguished surgeon) the symptoms become mitigated, and the tumour lessens, this remedy may be persevered in, for some time longer; but, if they continue with unabated violence, and the tumour resist every attempt at reduction, no farther trial should be made of the application." (*On Inguinal and Congenital Hernia.*) When ice has not been at hand, æther has occasionally been found a good substitute, when allowed to evaporate from the surface of the swelling.

Care must be taken, that the cold be not so applied as to freeze the scrotum, and bring on sloughing. (*A. Cooper, p.* 15.)

Opiates.—Mr. Hey has seen several cases, in which opiates, given freely, (in athletic persons after bleeding) have procured a reduction of strangulated hernia. He cannot say, however, that this remedy is generally successful; but, it has the advantage of removing, for a time, the pain and vomiting usually attendant on strangulation, even though it prove ultimately inefficacious. Opiates should be given in large doses, when it is wished to try their effect in procuring reduction; and whenever the symptoms of strangulation return, after having been removed by opiates, the operation should be performed without delay. (*P.* 134, 135.)

Tobacco Glysters.—For this purpose, some surgeons prefer a decoction of tobacco, made by infusing, or boiling, one dram of the plant, for ten minutes, in a pint of water; others employ the smoke, which is prepared, and introduced into the rectum, by means of a well-known apparatus for the purpose. Perhaps, both methods are equally efficacious; but, as one requires an apparatus, while the other does not, and is equally proper, the decoction may be entitled to most recommendation. The machine for the smoke is also frequently found out of order. Tobacco glysters are, next to the operation, the most certain means of bringing about the reduction of the strangulated parts. They not only excite the action of the intestines, they also exert a peculiar depressing influence on the whole system, reducing the pulse, and causing nausea and sickness, cold sweats and fainting, under which circumstances the parts recede spontaneously, or may be easily reduced. Mr. A. Cooper prudently advises injecting half the above quantity at first; for, he has seen two drams, and even one, when used as an infusion, and introduced at once, prove fatal. (*P.* 21.) The rest should presently be injected, when it appears, that the tobacco does not operate with the extraordinary violence, with which it does in a few particular constitutions.

Poultices and Fomentations.—We only make mention of these, to say, they have not the least confidence of any experienced, or intelligent surgeon. Whoever wastes time, in these urgent cases, in trying the effects of such applications, merits censure for his credulity, ignorance, and unfitness to undertake the treatment of a rapid disease, in which, as Pott remarks, if we do not get forward, we generally go backward; and whatever does no good, if it be at all depended upon, certainly does harm, by occasioning an irretrievable loss of time.

OF THE ORDER, IN WHICH THE PRECEDING METHODS AND REMEDIES SHOULD BE TRIED, AND OF THE TIME, WHEN THE OPERATION SHOULD NOT BE DELAYED.

In the treatment of a strangulated hernia, a surgeon cannot be too deeply im-

pressed with the danger of spending time in the trial of methods of inferior efficacy, or of such as are evinced to be ineffectual in the cases before them.

The rapidity, with which gangrenous mischief sometimes arises, and the patient loses his life, has been proved in a multitude of unfortunate examples, and should operate as a warning to all practitioners against the danger of deferring the operation too long. In the course of my reading, however, I have not met with so remarkable an instance of the sudden mortification, and rapidly fatal termination of a hernia, as the following case recorded by M. Larrey, in speaking of the fatiguing and forced marches performed by the French soldiers in Egypt. These marches, he says, brought on in one of the military "a hernia which formed suddenly, and became at the same time strangulated. He was immediately brought to my ambulance; but, a spontaneous gangrene, which had all on a sudden attacked the intestine, and extended to the other abdominal viscera, caused the patient's death in the space of two hours, and made it impossible for me to do the operation for him. This is the second example, that I have been acquainted with, in which the effects of the accident were thus rapid." (*Larrey, in Mémoires de Chirurgie Militaire, Tom.* 1, *p.* 196.)

The taxis is generally among the first things to be tried, and Mr. A. Cooper thinks the attempts should be continued for a quarter, or half an hour. When these have been ineffectual, the patient, if the circumstances do not forbid, should be immediately bled, and have a large opening made in the vein, so that the suddenness of the evacuation may be most likely to bring on fainting. The taxis should be tried once more as soon as this operation is finished.

In cases, where the strangulation is very *acute*, and the patient young and strong, perhaps, it may be most advisable to follow the advice delivered by Scarpa and Desault, and bleed the patient, and put him in the warm bath, before attempting the taxis.

If bleeding alone has been practised, and the manual efforts at reduction should not now succeed, the warm bath may be employed, *provided it can be got ready in a very short time*, but none should ever be lost in waiting for it to be prepared. When the bath is used, the taxis may be attempted, as the patient lies in the water; a situation, in which I have succeeded myself in reducing several herniæ.

Certainly not more, than one hour should ever be allotted for putting in practice the first attempts at reduction, bleeding, and the warm bath.

The plan should be, while the trial of one thing is going on, another should be preparing. So when the preceding measures have been tried in vain, the application of a bladder filled with ice, or the solution of salts, and the injection of tobacco, in the form of smoke, or decoction, should never be delayed for want of due previous preparation of all the requisites. Both these measures should be practised at the same time, immediately after the failure of the taxis, bleeding, and the warm bath. Mr. A. Cooper states, that four hours are enough for the trial of the tobacco glyster, together with cold applications.

In omental herniæ, the necessity for operating may frequently be obviated, by the good effects of bleeding, purgative medicines, and glysters, and leeches applied to the tumour. Mr. Lawrence has justly observed, that "when, as it very frequently happens, the aid of the surgeon is not required, until the complaint has lasted for some time, a trial of the tobacco, together with the topical use of cold, should be immediately resorted to, as circumstances will not admit of delay in the previous use of less powerful remedies." (*P.* 87.)

Every man who has seen much of herniæ, will immediately recognize the propriety of the following sentiments of the experienced Mr. Hey:

"I can scarcely press in too strong terms the necessity of an early recourse to the operation, as the most effectual method of preserving life in this dangerous disease. If Mr. Pott's opinion be true, that the operation, when performed in a proper manner, and in due time, does not prove the cause of death oftener than perhaps once in fifty times; it would undoubtedly preserve the lives of many, to perform it almost as soon as the disease commenced, without increasing the danger by spending much time in the use of means, which cannot be depended upon for a cure.

"I have twice seen this disease prove fatal in about twenty-four hours. In such cases it is evident there is little time for delay. A surgeon, who is competent to perform the operation, is not perhaps consulted till the intestine is on the point of being mortified, or is actually in a state of mortification. The dilemma into which he is then cast, is painful indeed. But when the fullest opportunity is afforded him of using the best mode of treatment, I am satisfied that his success will be the greatest when the operation is not long delayed. This, at least, has been my own experience. When I first entered upon the profession of surgery, in the year 1759, the operation for the strangulated hernia had not been performed by

any of the surgeons in Leeds. My seniors in the profession were very kind in affording me their assistance, or calling me into consultation when such cases occurred; but we considered the operation as the last resource, and as improper until the danger appeared imminent. By this dilatory mode of practice, I lost three patients in five upon whom the operation was performed. Having more experience of the urgency of the disease, I made it my custom, when called to a patient who had laboured two or three days under the disease, to wait only about two hours, that I might try the effect of bleeding (if this evacuation was not forbidden by some peculiar circumstances of the case) and the tobacco glyster. In this mode of practice I lost about two patients in nine upon whom I operated. This comparison is drawn from cases nearly similar, leaving out of the account those cases in which a gangrene of the intestine had taken place.

"I have now, at the time of writing this, performed the operation thirty-five times; and have often had occasion to lament that I had performed it too late, but never that I had performed it too soon. There are some cases so urgent, that it is not advisable to lose any time in the trial of means to produce a reduction. The delay of a few hours may cut off all hope of success, when a speedy operation might have saved the life of the patient." (*P.* 141, *&c.*)

To determine the exact moment, when to give up the trial of the preceding measures, and to have immediate recourse to the operation, is certainly difficult; but, no one can doubt, that this should rather be resorted to too early, than too late.

All directions must be general ones, liable to many exceptions: in rapid cases little, or no time should be allotted to the trial of any plan, and the operation should be done without the least delay. In other instances, we have full time to try the effects of every thing at all likely to succeed. The symptoms, which ought to guide us, in having recourse to the operation, arise from an attack of inflammation in that part of the intestine contained in the hernial sac, and from its spreading into the abdominal cavity. It is in proportion to their violence, that we ought to urge the performance of the operation. Mr. A. Cooper considers pain on pressing the belly, and tension, as the symptoms, which point out its immediate necessity. He adds, "Indeed, there is scarcely any period of the symptoms, which should forbid the operation; for, even if mortification has actually begun, the operation may be the means of saving life, by promoting the ready separation of gangrenous parts." (*On Inguinal and Congenital Hernia, p.* 27.)

Whenever the surgeon has succeeded in reducing the parts, without having recourse to the knife, if the symptoms of pain, inflammation, &c. ran high before such reduction, they will not always cease immediately afterwards. As they probably depend on the reduced bowel having been inflamed by the stricture, the body should be kept open, and the diet and regimen should be low and sparing, while the least degree of pain and tension remain; in short, till all complaint is absolutely removed from the abdomen, and the intestines do their office freely, and without trouble. (*Pott.*)

PROGRESS OF THE SYMPTOMS OF A STRANGULATED HERNIA.

The earliest symptoms have been already related, viz. "tumour in the groin, or scrotum, attended with pain, not only in the part, but all over the belly, and creating a sickness and inclination to vomit, suppression of stools, and some degree of fever. These are the first symptoms, and, if they are not appeased by the return of the intestine, that is, if the attempts, made for this purpose, do not succeed; the sickness becomes more troublesome, the vomiting more frequent, the pain more intense, the tension of the belly greater, the fever higher, and a general restlessness come on, which is very terrible to bear. When this is the state of the patient, no time is to be lost; a very little delay is now of the utmost consequence, and if the one single remedy which the disease is now capable of be not administered immediately, it will generally baffle every other attempt. This remedy is the operation, whereby the parts engaged in the stricture may be set free. If this be not now performed, the vomiting is soon exchanged for a convulsive hiccough, and a frequent gulping up of bilious matter; the tension of the belly, the restlessness and fever having been considerably increased for a few hours, the patient suddenly becomes perfectly easy, the belly subsides, the pulse from having been hard, full, and frequent, becomes low, languid, and generally interrupted; and the skin, especially that of the limbs, cold and moist; the eyes have now a languor and a glassiness, a lacklustre not easy to be described; the tumour of the part disappears, and the skin covering it, sometimes changes its natural colour for a livid hue; but whether it keeps or loses its colour, it has an emphysematous feel, a crepitus to the touch, which will easily be conceived by all who have attended to it, but is not so easy to

convey an idea of by words: this crepitus is the too sure indicator of gangrenous mischief within. In this state, the gut either goes up spontaneously, or is returned with the smallest degree of pressure; a discharge is made by stool, and the patient is generally much pleased at the ease he finds; but this pleasure is of short duration, for the hiccough and the cold sweats continuing and increasing, with the addition of spasmodic rigors and subsultus tendinum, the tragedy soon finishes." (*Pott.*)

ANATOMY OF THE BUBONOCELE, OR INGUINAL HERNIA.

This subject must necessarily precede the account of the operation, which would otherwise be unintelligible. It is chiefly in the anatomical information, relative to herniæ, and the mode of operating, that modern surgeons have a decided superiority over their predecessors; for, before Gimbernat, Camper, Hey, and A. Cooper, published their several works on herniæ, the anatomy of the disease was only imperfectly understood.

The tendinous fibres of the aponeurosis of the external oblique muscle, as they run downwards and forwards towards the pubes, separate from each other, so as to leave a triangular opening, called the abdominal ring. The upper and inner pillar (as it is termed) of this aperture is inserted into the symphysis of the pubes; the lower and outer one, which is only the continuation of Poupart's ligament, is fixed into the angle and crista of the same bone. Some tendinous fibres cross the upper and outer angle of the ring, so as to diminish the triangular appearance of the whole aperture: these are said to be very strong in old herniæ. The anterior and thicker layer of the aponeurosis of the internal oblique muscle joins the tendon of the external oblique; the posterior and thinner one joins that of the transversalis; but the lower portion of this tendon, together with the corresponding part of the transversalis, goes wholly in front of the rectus muscle. Thus the inferior border of the obliquus internus and transversalis, which originates from the upper part of Poupart's ligament, lies behind the outer pillar of the abdominal ring. Mr. A. Cooper was the first, who noticed, that a thin fascia proceeded from the inner edge of Poupart's ligament, and spread itself over the posterior surface of the transversalis. This forms the only partition between the peritoneum and the outer opening of the abdominal ring, and were it not for its existence, inguinal herniæ would probably be much more frequent.

The spermatic vessels, joined by the vas deferens, proceed before the epigastric artery, very near the place where it arises. They then run through the above fascia, go under the edge of the internal oblique and transverse muscles, and next obliquely downwards and forwards, between the above fascia, and aponeurosis of the external oblique to the opening of the ring.

Thus we see, that the spermatic cord runs through a kind of canal, before it actually emerges at what is named the abdominal ring. This oblique passage of the cord, through the abdominal parietes, was well known to and elegantly delineated by Albinus; Gimbernat makes distinct mention of it in his *Account of a new Method of Operating for Femoral Hernia*, *p.* 19—32; but, no one, before Mr. A. Cooper, considered the thing with due attention.

The abdominal ring is then only the outer opening of the canal, or passage, through which the spermatic cord passes before it emerges. The inner one, at which the viscera in cases of inguinal hernia first protrude, is situated about an inch and a half from the abdominal ring, in the direction towards the anterior spinous process of the ilium. This inner opening is rather nearer the pubes, than the ilium, and its upper border is formed by the lower edge of the internal, oblique, and transverse muscles, which can be plainly felt with the finger, introduced upward and outward into the abdominal ring.

"The precise point, at which the hernia most commonly commences, (says Scarpa) is that which corresponds, in the fœtus, to the communication of the tunica vaginalis with the peritoneum, and, in the adult, to the passage of the spermatic cord under the transverse muscle. In the sound state, the peritoneum presents at this part a small funnel-like depression, the depth of which increases in proportion as the spermatic cord is pulled from above downwards. It is this small pouch, this sort of digital appendage, whose progressive developement constitutes the hernial sac. Resting upon the anterior surface of the spermatic cord, it first makes its appearance under the inferior edge of the transverse muscle; thence it extends itself in the separation of the inferior fleshy fibres of the internal oblique muscle, always following the spermatic cord, in front of which it is situated; and after having in this manner passed through the whole of the canal, which extends from the iliac region to the pubes, it lastly protrudes at its external orifice, which is the inguinal (or abdominal) ring properly so called. In all this track, the hernial sac, as well as the spermatic cord, is situated above the femoral arch, the direction of which it follows. The canal, which it traverses, is of a conical shape, the apex of which is

towards the flank, and the base at the external orifice of the ring." (*Scarpa, Traité des Hernies, p.* 44, 45.)

The epigastric artery runs behind the spermatic cord, along the inner margin of the internal opening of the above canal, then upwards and inwards, so as to pass at the distance of half an inch, or an inch from the upper extremity of the outer opening, or abdominal ring.

In common cases of inguinal hernia, the viscera, protruded at the inner opening, above described, lie over the spermatic cord, and form a tumour on the outside of the abdominal ring. They may, however, insinuate themselves into the inner opening, without descending sufficiently to protrude through the external one, or abdominal ring. The stricture may take place at either of these openings. In recent and small hernia, according to Mr. A. Cooper, the strangulation is most frequently situated at the inner opening; in large old ruptures, at the abdominal ring. Even when the parts are completely protruded out of the latter opening, the strangulation may exist at the inner one: but, there may occasionally be two strictures, viz. one at each opening. (*Lawrence on Hernia, p.* 103.)

The hernial sac descends through the abdominal ring over the spermatic cord, and is covered by a fascia, sent off from the tendon of the external oblique muscle. Beneath this fascia, the cremaster muscle is also situated over the sac. When this has descended a certain way, it lies on the tunica vaginalis, as well as the spermatic cord.

As the epigastric artery naturally runs first behind the spermatic cord, and then along the inner margin of the internal opening of the ring, and as the viscera are protruded over the cord, they must be situated on the outer side of the artery, which runs first behind the neck of the sac, and then on its inner side. Hence, the inner margin of the sac, when inspected on the side towards the abdomen, seems to be formed, as it were, by the track of the vessel. (See *Lawrence*, p. 106.) That this is the ordinary situation of the epigastric artery, in relation to the inguinal hernia, is confirmed by the concurrent testimonies of Camper, Chopart, Desault, Sabatier, A. Cooper, &c. and by preparations to be seen in almost every museum.

In recent inguinal herniæ, the internal and external openings of the ring are at some distance from each other, the first being situated obliquely upwards and outwards in relation to the former; but, the pressure of the protruded viscera, gradually brings them nearer together, so that in large herniæ of long standing, the opening into the abdomen is almost direct, and the epigastric artery becomes situated nearer the pubes, than in the natural state.

Though such is the ordinary direction, in which a bubonocele protrudes, there are occasional varieties. In one of these, the viscera, instead of descending through the canal of the ring, are at once thrust through the abdominal ring itself, and the opening into the belly is then direct: the hernial sac, instead of passing on the external side of the spermatic vessels, as is usual, now lies on their inner, or pubic side; and the epigastric artery, which is commonly situated behind, now pursues its course, in front of the sac, at its usual distance from the upper and outer angle of the abdominal ring.

The following is Scarpa's description of the displacement of the epigastric artery in the greater number of cases of inguinal hernia. "This artery, which, in the natural state, runs about ten lines from the abdominal ring, has its situation and direction so changed, in subjects affected with hernia, that it crosses the posterior part of the neck of the hernial sac, and is pushed from the outer to the inner side of the abdominal ring. In order to comprehend the reason of this displacement, it is necessary to recollect what I have elsewhere said of the formation of inguinal hernia, and of the manner, in which the spermatic cord crosses the epigastric artery. The hernia begins to form at the very place, where the spermatic cord passes under the inferior margin of the transverse muscle; and this place is rather nearer the flank, than that where the epigastric artery passes towards the rectus muscle. In its progressive developement, the hernial sac constantly follows the same track as the spermatic cord, since it is situated upon its anterior surface. As has been already explained, this cord crosses the epigastric artery; consequently, the hernial sac must necessarily pass with the cord above this artery, before protruding from the canal of the abdominal ring. At the same time, the internal orifice of the hernia becoming larger, and the inguinal canal shortened by the approximation of its two orifices to each other, it follows, that, at the period, when the hernia begins to make its appearance in the groin, the epigastric artery is unavoidably situated behind the neck of the hernial sac, and is pushed from the outer to the inner side of the ring. Let us suppose a piece of string to be passed from the inside of the abdomen into the scrotum, all through the inguinal canal, and the middle of the hernia; and that this string is pulled so as to bring the internal orifice of the hernia, which is situated beyond the point where the spermatic cord crosses the epigastric artery; this artery will immediately be found to

be carried from the outer to the inner side of the neck of the hernial sac. The same thing happens from the effect of the developement of the hernia. The removal of the epigastric artery from one side of the ring to the other (says Scarpa) is a phenomenon, which may be regarded as almost constant in the inguinal hernia. I have examined the bodies of a great number of subjects, affected with this species of hernia; and it has been only in a very few, that I met with the epigastric artery retaining its natural situation on the outer side of the abdominal ring. In investigating the reason of this exception, I have observed, in all the individuals who presented it, a very remarkable weakness and flaccidity of that part of the abdominal parietes, which extends from the flank to the pubes. In all the displaced viscera had passed through the aponeuroses of the transverse and internal oblique muscles, not in the vicinity of the ilium, as is commonly the case, but, at a little distance from the pubes, giving to the upper pillar of the ring a curvature that is extraordinary, and disproportioned to the smallness of the hernia. I observed, also, that the neck of the hernial sac did not pass in an oblique direction from the flank to the pubes, but, that it protruded from the abdomen almost in a direct line from behind forwards. In short, in these individuals, the small culde-sac of the peritoneum, which constitutes the origin of the hernial sac, had not begun to be formed under the edge of the transverse muscle, at the point where the spermatic cord runs outward; but, it had passed through the aponeuroses of the internal oblique and transverse muscles, at a little distance from the pubes, and within the point, at which the spermatic cord crosses the epigastric artery. The small hernial sac, having at this part come into contact with and united to the spermatic cord protrudes at the external orifice of the inguinal canal, without displacing the epigastric artery from its natural situation.

"This species of hernia, properly speaking, is a mixture of the ventral and inguinal. It resembles the former, inasmuch as the hernial sac pierces the aponeuroses of the transverse and internal oblique muscles; the latter, inasmuch as it passes out at the abdominal ring, conjointly with the spermatic cord." (*Scarpa, Traité des Hernies, p.* 68, *&c.*) In most instances, the spermatic cord lies behind or under the hernial sac. There are cases, however, in which the vas deferens is found on the outer side of the sac, while the rest of the spermatic cord lies, as it usually does, on the inner side, or rather under this part. (*Cooper.*) Le Dran, Schmucker, and Blizard, have found the whole cord situated in front of the sac. Sometimes the vas deferens has run on the front and inner part, and the rest of the cord on the back and external part of the swelling. (*Camper, Hey.*) The cord has been known to be before, and the vas deferens behind the sac. (*Camper, Cooper.*)

Upon this part of the subject, the reader may deem the following passage interesting. "While the hernia is of moderate size (says Scarpa) the surrounding cellular substance is not very greatly compressed, and no change is observed in the situation of the spermatic vessels. The artery and veins of this name always form, with the vas deferens, one single cord, which is intimately adherent to the posterior surface of the hernial sac. But, in proportion as the tumour increases in size, the cellular substance, which immediately surrounds it and unites it to the spermatic cord, is more and more distended and compressed. At length, at a certain period, the distention is carried to such a pitch, that the spermatic vessels are separated from one another, and change their position with respect to the hernial sac. This kind of gradual decomposition of the spermatic cord is quite similar to that, which would be produced by pulling the surrounding cellular substance in two opposite directions. Such is the reason, why, in scrotal herniæ of large size, the spermatic artery, the vas deferens, and the spermatic veins are found separated upon the posterior surface of the sac. All these vessels, instead of being conjoined in one cord, are divided by interspaces, which are sometimes very considerable. Ordinarily, the vas deferens is less separated from the spermatic artery, than from the vein of this name. In some subjects, Camper has seen it situated on one side of the sac, and the artery and veins on the other. (*Icones Herniarum, tab.* 5. *L. O. Tab.* 8. 1. 2.) The displacement and decomposition of the spermatic cord take place equally in adults and in children affected with large scrotal herniæ. (*Camper, loco cit.*) In general, towards the upper part and neck of the hernia, the vessels are not much separated; but, as they proceed downwards, they diverge more and more. Sometimes, when the hernia is very old and voluminous, they are no longer found at the posterior part, but rather at the sides, and even on the front surface of the sac; they shew themselves through the cremaster muscle, which covers them, and form a sort of vascular train, which arrests the hand of the operator at the moment, when he is about to open the hernial sac. Le Dran relates, that, in operating upon a large scrotal hernia, he found the spermatic cord on the anterior surface of the hernial sac. (*Operations de Chir. p.* 127.) This fact has been the cause of numerous

conjectures, and appeared altogether inconceivable to such surgeons, as have not been acquainted with the changes, to which the spermatic cord is exposed, in cases of large scrotal herniæ. (Lassus, Med. Operat. Tom. 1, p. 152, cannot conceive the possibility of the occurrence.) The observation of Le Dran is not the less true and exact: it exemplifies a very important fact, of which it is easy to give a true explanation, when the state of the spermatic cord in ordinary inguinal herniæ, and in those, which have obtained a considerable size, has been comparatively examined. In the first, the spermatic cord quite entire is always found situated on the posterior surface of the hernial sac; but, in the second, the spermatic vessels are so separated from one another, that they sometimes extend over the sides and even the forepart of the hernial sac." (*Scarpa, Traité des Hernies, p.* 61, *&c.*)

The hernial sac is commonly described as an elongation of peritonæum. When more minutely examined, however, it is found, in cases of inguinal hernia, to consist of the portion of peritonæum, pushed out with the viscera; of a layer of cellular substance on the outside of this, which becomes more or less thickened by the pressure of the rupture in different cases; of a fascia, sent off from the tendon of the external oblique muscle; and of the cremaster muscle, which latter parts form the exterior covering, which consisting of several layers, often leads the operator to fancy he has opened into the cavity of the sac, when, in reality, he has not.

It is observed by Professor Scarpa, that "the cremaster muscle, in cases of old large scrotal herniæ, acquires a thickness, which is really surprising. Its fibres, which are naturally very thin, become from four to six times more considerable. Being spread over the neck and body of the hernial sac, they sometimes present a remarkable consistence, and a yellowish colour. Such alteration, however, does not prevent the muscular texture from being discovered, and Haller was not mistaken about it. (*Opusc. Patholog. pag.* 317.) Pathology furnishes us with several examples of similar changes of organization. In certain cases, the muscular coat of the bladder, that of the stomach and intestines, and even the exceedingly delicate fleshy fibres of the ligaments of the colon, are found to have become yellow, and much thickened.

"In old scrotal herniæ (says Scarpa) it is not unusual to find an intimate adhesion of the fibres of the cremaster muscle to the edges of the abdominal ring. This may depend on the pressure, which the contents of the hernia may make on those edges, and perhaps it may also depend on the union of the cremaster muscle with the prolongation of the aponeurosis of the fascia lata, which is continued from the margins of the ring to the groin and scrotum. Howsoever it may be, certain it is, that in old large scrotal herniæ, there is much difficulty in introducing a probe between the fleshy fibres of the cremaster and the margin of the abdominal ring; and that, on the contrary, in recent herniæ, a probe passes as easily between the edges of the ring and the cremaster, as between this muscle and the hernial sac.

"Few authors (according to Scarpa) have spoken of the sheath, formed by the cremaster muscle, in which are enclosed the hernial sac, the spermatic cord, and the tunica vaginalis of the testicle. Sharp (*In Critical Enquiry*) and Monro, the father, (*Anat. and Chirurg. Works, p.* 553.) were the first to dwell upon this important pathological point. Monro had seen the cremaster muscle covering the hernial sac; but, he did not believe, that the same thing occurred in all individuals affected with inguinal hernia. In this respect, he was mistaken; for, this disposition of the cremaster muscle is one of the essential characters of the disease. Petit has not omitted to describe the relations, which exist between the cremaster and the hernial sac. (*Œuvres Posthum. Tom.* 1, *p.*288.) On this subject, he even relates an interesting fact, from which it results, that, in certain cases, this muscle may by its contractions alone cause a reduction of the hernia. Gunz explains, with tolerable perspicuity, how the cremaster and its aponeurosis form one of the coverings of the inguinal and scrotal hernia. (*Libellus de Herniis, p.* 50.) Morgagni once saw its fleshy fibres extended over the hernial sac; (*De sed. et caus. morb. epist.* 34, *art.* 9; *epist.* 31, *art.* 15.) and Neubaver positively assures us, that he has made the same remark upon the dead body of a man affected with an entero-epiplocele. (*Dissert. de Epiploo-oscheocele.*) After these facts, so positive and accurately observed, I cannot comprehend (says Scarpa) how in our time Pott, Richter, and several other authors, should have passed over in silence, or only mentioned vaguely, this point, so important in the history of the inguinal and scrotal hernia." (*Scarpa, Traité des Hernies, p.* 48—50.)

When surgeons speak of a hernial sac being usually thicker and stronger, in proportion to the magnitude and duration of the hernia, they do not imply, that this alteration only occurs in the mere peritonæum.

In very enormous hernia, the pressure of the contents is so great, that, instead of thickening the sac, it renders it thinner, and even makes it ulcerate. The protruded viscera have been met with imme-

diately beneath the integuments, when the sac has been burst by a blow. (*Cooper; J. L. Petit.*)

The outer surface of the peritoneal part of the hernial sac, is always most closely adherent to the other more external covering by means of cellular substance. This connexion is formed so soon, after the first occurrence of a hernia, that any hopes of returning a hernial sac into the abdomen are now generally considered as merely chimerical. There must, however, be a certain space of time, before adhesions form, though it is, no doubt, exceedingly short.

Upon this point, Scarpa does not adopt the opinion commonly received.

"It has long been disputed, (observes this author) whether it is possible to reduce a hernial sac into the abdomen with the intestine. But, it has happened, as in most discussions, that every one has endeavoured rather to support his own opinion, than appreciate the facts opposed to him. On both sides, they have neglected to consult observation, which alone ought to be the basis of our judgment in similar matters.

"There is no doubt, that, in recent and small inguinal herniæ, the intestine, strangulated by the neck of the hernial sac, has been known, in more instances than one, to have been reduced by the taxis, and carried with it the whole of the sac into the abdomen. Observations, not less authentic, inform us, that, after the operation for hernia, when the viscera could not be reduced on account of their adhesions to the sac, they have been seen, notwithstanding such adhesions, to get nearer to the ring daily, and at length, spontaneously to return into the belly together with the hernial sac. Louis was wrong in denying the possibility of these facts. (*Acad. Royale de Chirurgie, Tom.* 11, *p.* 486.) For my part, (continues Scarpa) I regard them as very correct, according to my own experience, and that of several other surgeons. It appears, that the illustrious secretary of the academy, only refused to put confidence in such well-attested cases, because they were contrary to an opinion, that he had set up with great assurance: he pretended that neither art, nor nature, could ever accomplish the reduction of the hernial sac, unless the cellular substance, which unites it to the spermatic cord and surrounding parts, were torn. Apparently he forgot, that, under certain circumstances, the cellular substance will bear, without laceration, a considerable elongation, and afterwards shrink again. It is thus, that we often see a viscus, which has suffered a considerable displacement, return spontaneously into its natural situation. Pathology would furnish us with a great number of similar examples; but, not to depart from our subject, daily experience proves, that, in the inguinal hernia, the spermatic cord is elongated, and descends farther, than in the natural state. No laceration of the cellular substance, however, is then occasioned; for, if the hernia be kept reduced, the spermatic cord becomes shorter, daily retracts, and at last has only the same length, which it had previously to the disease. When a sarcocele becomes large and heavy, the portion of the spermatic cord, naturally situated within the belly, is by degrees drawn out into the scrotum; but, after the tumour is extirpated, this portion ascends again, and of itself returns into its original situation.

"The same thing happens after the operation for the strangulated inguinal hernia. All practitioners have noticed, that the hernial sac retracts and reascends progressively towards the ring. That alone would prove, that the cellular substance, which surrounds the spermatic cord, and unites it to the hernial sac, is highly endued with the property of yielding, and afterwards returning to its original state. Can the same property be refused to the cellular substance, which unites the sac to the cremaster muscle and other surrounding parts?

"While the inguinal hernia is recent, and not of much size, the cellular substance in question possesses all its elasticity, and hence, the hernial sac and the spermatic cord, may easily ascend towards the abdominal ring. I have had occasion (says Scarpa) to make this observation upon the dead body of a man, who had an incipient inguinal hernia. The small hernial sac was capable of being pushed back into the ring with the utmost facility; and in carefully examining the parts, both within and without the belly, it appeared to me, that the cellular substance, which united the sac to the spermatic cord and cremaster muscle, was disposed to yield equally from without inwards, and in the direction precisely opposite; that is to say, it made an equal resistance to the protrusion and the reduction of the hernial sac. Monteggia has seen a case exactly similar: although, according to his own expressions, (*Instituz. Chirurg. Tom.* 3, *sez.* 2, *p.* 249.) the hernial sac was not very small, it adhered very loosely to the surrounding parts, and it admitted of being entirely reduced into the abdomen with great facility. It might indeed be strictly said, that this is not a true reduction, because in pushing back the hernial sac, we only just squeeze it up behind the ring, whence it is forced out again by the slightest effort. But, whatever we may please to term this *retrocession* of the hernial sac, it is not the less proved, in an evident manner, that, in the small and re-

cent inguinal hernia, the hernial sac, together with the viscera which it contains, may be returned into the abdomen.

"This is not the case with large old scrotal herniæ. In these, the cellular substance, which unites the sac to the spermatic cord, and cremaster muscle, has acquired such a density, that it does not oppose less resistance to the further developement of the hernia, than to the efforts of the surgeon, who endeavours to effect its reduction." (*Scarpa, Traité des Hernies, p. 57, &c.*)

We shall conclude this anatomical account of the inguinal hernia, with the following explanation of the parts as they appear on dissection: "the removal of the integuments exposes the exterior investment of the hernial tumour, continuous with the margins of the ring, and formed of tendinous fibres, from the aponeurosis, the cremaster muscle, &c. This is connected by cellular substance with the proper hernial sac, formed of the peritonæum. This production of the peritonæum passes through the ring of the external oblique, and then goes upwards and outwards. Behind and above the ring, the inferior margin of the obliquus internus and transversalis crosses the neck of the sac. When these muscles are reflected towards the linea alba, the fascia, ascending from Poupart's ligament, and forming the upper opening of the ring, is exposed, and the epigastric artery is discovered emerging from the inner side of the neck of the hernial sac, (*Camper*;) which, at this precise point, becomes continuous with the peritonæum, lining the abdomen. The removal of the hernial sac will disclose the course of the spermatic cord in its descent towards the testicle; and when this is also elevated, the first part of the course of the epigastric artery, and its origin from the iliac trunk, are laid open." (*Lawrence on Hernia, p. 115, 116.*)

In females, the round ligament of the uterus bears the same relation to the tumour, as the spermatic cord in males. In the former subjects, bubonoceles are uncommon. Mr. Lawrence had a very rare instance pointed out to him, in which a bubonocele in a female was situated on the inner side of the epigastric artery.

MARKS OF DISCRIMINATION BETWEEN SOME OTHER DISEASES AND INGUINAL HERNIÆ.

The disorders in which a mistake may possibly be made, are the *Cirsocele*, *Bubo*, *Hydrocele*, and *Hernia Humoralis*, or *Inflamed Testicle*.

For an account of the manner of distinguishing the first complaint from a bubonocele, see *Cirsocele*.

"The circumscribed incompressible hardness, the situation of the tumour, and its being free from all connexion with the spermatic process, will sufficiently point out the first, at least while it is in a recent state; and when it is in any degree suppurated, he must have a very small share of the *tactus eruditus*, who cannot feel the difference between matter, and either a piece of intestine, or omentum.

"The perfect equality of the whole tumour, the freedom and smallness of the spermatic process above it, the power of feeling the spermatic vessels and the vas deferens in that process, its being void of pain upon being handled, the fluctuation of the water, the gradual formation of the swelling, its having begun below and proceeded upwards, its not being affected by any posture or action of the patient, nor increased by his coughing or sneezing, together with the absolute impossibility of feeling the testicle at the bottom of the scrotum, will always, to an intelligent person, prove the disease to be a hydrocele." Mr. Pott, however, allows, that there are some exceptions, in which the testicle cannot be felt at the bottom of the scrotum in cases of hernia. In recent bubonoceles, while the hernial sac is thin, has not been long, or very much distended, and the scrotum still preserves a regularity of figure, the testicle may almost always be easily felt at the inferior and posterior part of the tumour. But, in old ruptures, which have been long down, in which the quantity of contents is large, the sac considerably thickened, and the scrotum of an irregular figure, the testicle frequently cannot be felt, neither is it in general easily felt in the *congenital hernia* for obvious reasons." (*Pott.*)

"In the *hernia humoralis*, the pain in the testicle, its enlargement, the hardened state of the epidydimis, and the exemption of the spermatic cord from all unnatural fulness, are such marks as cannot easily be mistaken; not to mention the generally preceding gonorrhœa. But, if any doubt still remains of the true nature of the disease, the progress of it from above downward, its different state and size in different postures, particularly lying and standing, together with its descent and ascent, will, if duly attended to; put it out of all doubt, that the tumour is a *true hernia*." (*Pott.*)

When an inguinal hernia does not descend through the abdominal ring, but only into the canal for the spermatic cord, it is covered by the aponeurosis of the external oblique muscle, and the swelling is small and undefined.

Now and then, the testicle does not descend into the scrotum till a late period. The first appearance of this body at the ring, in order to get into its natural si-

tuation, might be mistaken for that of a hernia, were the surgeon not to pay attention to the absence of the testicle from the scrotum, and the peculiar sensation occasioned by pressing the swelling.

OPERATION FOR THE STRANGULATED INGUINAL HERNIA, OR BUBONOCELE.

This consists in dividing the integuments; dissecting down to the sac, and opening it; removing the stricture; and replacing the protruded viscera.

The external incision should begin an inch above the external angle of the ring, and extend over the middle of the tumour to its lower part. The advantage of beginning the wound so high, is to obtain convenient room for the incision of the stricture. By this first cut, the external pudic branch of the femoral artery may be divided; it crosses the hernial sac near the abdominal ring, and sometimes bleeds so freely, that it should be immediately tied. In general, however, a ligature is unnecessary.

When carrying this incision low down, we should always bear in mind the caution given by Camper, that there is a possibility of dividing the spermatic vessels, should they happen to be situated, as they sometimes are, in front of the hernia. The division of the integuments brings into view the fascia, which is sent off from the tendon of the external oblique muscle, and covers the hernial sac.

The layers of tendinous fibres, cellular substance, &c. intervening between the skin and sac, should be carefully divided, one after another, with the knife and dissecting forceps, taking care to incline the edge of the instrument horizontally, for fear of cutting too deeply at once, and injuring the viscera contained in the sac.

After making a small opening through a part of the fascia covering the sac, some advise introducing a director, and laying it open upward and downward as far as the tumour extends. The same manner of proceeding, they next recommend in regard to the cremaster muscle. Thus the sac becomes completely exposed. When this method is followed, Mr. A. Cooper advises the incisions not to be carried upward, nearer, than one inch, to the abdominal ring, for reasons which will be presently explained.

However it may be rationally doubted, whether there is any good in these regular and successive divisions of the whole length of the coverings of the sac; and it is certain, that they protract the operation very much. As the grand object, after dividing the skin, is to make a small opening into the sac, sufficient for the introduction of a director, dissecting down at one particular place, answers every purpose, and enables us, in the end, to lay open the whole of the sac and its coverings in the shortest time. Let the operator only take care to raise the successive layers of fibres with the forceps, and divide the apex of each elevated portion with the knife held horizontally. As there is commonly a quantity of fluid in the sac, and it gravitates to the lower part, to which place the intestine seldom quite descends; this is certainly the safest situation for making the first opening into the sac. The operator, however, relying on the presence of such fluid, should not cut too boldly: sometimes none at all is found, and the viscera are in immediate contact with, nay, adherent to, the inner surface of the sac.

The circular arrangement of the vessels of a piece of intestine, and its smooth polished surface, sufficiently distinguish it from the hernial sac, which has a rough cellular surface, and is always connected with the surrounding parts. (*Lowrence*, *p.* 125.)

We have mentioned, that Mr. A. Cooper only advises cutting the fascia, and other coverings of the sac, under the skin, to within an inch of the abdominal ring: he also recommends, of course, limiting the division of the sac itself to the same extent. His reasons, for this practice, are to avoid making the closure of the wound more difficult, and to lessen the danger of peritoneal inflammation.

Having laid open the hernial sac, with a probe-pointed bistoury, guided on a director, or the fore-finger, introduced into the opening, which is made at the lower part of the sac, the next desideratum is to divide the stricture, unless the viscera admit of being easily reduced, without such an incision being made, as occasionally happens.

From the anatomical account we have given of the bubonocele, it appears, that the stricture may either be situated at the abdominal ring, and be formed by the margins of this opening, or else at the inner aperture of the canal, about one inch and a half, in a direction upward and outward, from the outer opening in the tendon of the external oblique muscle. This latter strangulation is caused by the semicircular edge of the transversalis muscle and its tendon, which pass over the neck of the hernial sac, and by a fascia, arising from Poupart's ligament, the semicircular border of which passes under this part of the sac.

The common, and probably the best, practice is to divide the hernial sac, together with the stricture. When this is situated at the abdominal ring, the surgeon is to introduce the end of a director a little way into the neck of the sac, within the aperture in the tendon, and with a

probe-pointed bistoury, guided on the latter instrument, he is to cut the stricture upward and outward, or else directly upward; a manner, which Mr. A. Cooper recommends because it is applicable to all cases, even those less frequent ones, in which the hernia protrudes on the inner side of the epigastric artery. This vessel, as we have already explained, commonly runs upward round the inner side of the neck of the sac; so that cutting the stricture upward and inward would be very apt to divide it.

Cutting upward and outward is, in ordinary cases, perfectly safe; and is only objectionable in a few occasional instances, in which the hernia descends on the inner side of the artery. Mr. A. Cooper's rule of always cutting in one direction, viz. upward, which is proper in every instance, is in my opinion well worthy of universal adoption. No more of the parts, forming the stricture, should be cut, than is just sufficient for allowing the protruded viscera to be reduced, without bruising, or otherwise hurting them. The middle of the upper margin of the ring is the safest place for making the necessary incision.

Mr. A. Cooper, in his late work on the Inguinal Hernia, advises a mode of dividing the stricture, considerably different from the usual method. He directs the finger of the operator to be introduced into the sac, (which in his plan, we know is left undivided for the space of one inch below the ring.) When the stricture is felt, a probe-pointed bistoury is to be conveyed over the front of the sac into the ring (between the two parts), and the latter only is then to be divided, in the direction upward, opposite the middle of the neck of the sac, and to an extent just sufficient to allow the protruded parts to be returned into the abdomen, without their being hurt. The two chief advantages, which Mr. A. Cooper imputes to this method, are, that the danger of peritoneal inflammation will be less, and that the epigastric artery, if wounded, would not bleed into the abdomen. I am of opinion, that what Mr. Lawrence has remarked, concerning this proposal, is exceedingly judicious: "An accurate comparative trial of both methods would be necessary, in order to determine the weight of the first reason. The second circumstance cannot be a matter of any importance, if we cut in such a direction as to avoid the risk of wounding the artery. Many circumstances present themselves as objections to this proposal. The manœuvre itself, although perhaps easy to the experienced hand of such an able anatomist as Mr C., would, I am convinced, be found highly difficult, if not impracticable, by the generality of surgeons. This difficulty arises from the firm manner, in which the sac and surrounding parts are connected, we might almost say, consolidated together. The experience of Richter (*Traité des Hernies*, *p.* 118) shews, that this objection is founded in reality. He once tried to divide the ring, without cutting the sac, but he found it impracticable. If the stricture is so tight, as to prevent the introduction of the finger, there must be great danger of wounding the protruded parts. The practice would still be not advisable, even if it could be rendered as easy as the common method of operating. Mr. C. leaves an inch of the sac, below the ring, undivided; thus a bag remains ready to receive any future protrusion, and the chance of a radical cure is diminished. It would be better to follow the advice of Richter, and scarify the neck of the sac, in order to promote an adhesion of its sides. He has found this practice so successful in accomplishing a radical cure, that he advises (p. 191.) its employment in every operation for strangulated hernia." (*Treatise on Hernia*, *p.* 144.)

If the stricture should be felt to exist at the inner opening of the canal for the spermatic cord, Mr. A. Cooper advises the operator to introduce his finger into the sac, as far as the stricture, and then to insinuate a probe-pointed bistoury, with the flat part of its blade turned towards the finger, between the front of the sac and the abdominal ring, till it arrives under the stricture, formed by the lower edge of the transversalis and obliquus internus. Then the edge of the instrument is to be turned forward, and the stricture cut in the direction upward. This plan of not cutting the neck of the sac, is liable to all the objections stated by Mr. Lawrence, in regard to the case, in which the strangulation takes place at the abdominal ring. It should be mentioned, that Mr. A. Cooper's bistoury is a very proper one for dividing the stricture, as it only has a cutting edge to a certain distance from the point. Perhaps, on the whole, we may infer, that it is both most easy and advantageous to divide the neck of the sac, together with the stricture, whether this be situated at the ring, or more inward. In the latter case, cutting upward and outward would always be perfectly safe, because the hernia always protrudes on the outer side of the epigastric artery; but, as it is easiest for the memory to adhere to one rule, making the incision immediately upward is a very proper plan.

Room being made for the reduction of the protruded parts into the abdomen, by the division of the stricture, they are to be immediately returned, if sound, and free from adhesions. This object is considerably facilitated by bending the thigh. The

intestines are to be reduced before the omentum, but, when a portion of mesentery is protruded, it is to be returned before either of the preceding parts. The intestine should always be reduced, unless it be found in a state of actual mortification. It often appears so altered in colour, that an uninformed person would deem it improper to return it into the abdomen. However, if such alteration should not amount to a real mortification, experience justifies the reduction of the part. Mr. A. Cooper has judiciously cautioned the operator not to mistake the dark chocolate-brown discolourations, for a state of gangrene. With these the protruded part is frequently found affected; and, as they generally produce no permanent mischief, they ought to be carefully discriminated from the black-purple, or lead-coloured spots, which usually precede mortification. To determine whether a discoloured portion of intestine be positively mortified, some recommend pressing forward the blood contained in the veins, and, if they fill again, it is looked upon as a proof, that the bowel is still possessed of life.

In returning a piece of intestine into the abdomen, the surgeon should first introduce the part, nearest the ring, into this aperture, and hold it there till another portion has succeeded it. This method is to be followed up, till the whole of the protruded bowel is reduced.

Writers on surgery cannot too severely reprobate the employment of any force, or violence, in endeavouring to return the contents of a hernia in the operation: a method the more pernicious, because such parts are commonly more or less in a state of inflammation. It is always more judicious to enlarge the stricture, than to pinch and bruise the bowel in trying to get it through an opening which is too small. Distention of the intestine sometimes prevents the reduction: but, the bowel can then be generally returned as soon as its contents are first compressed into the part of the intestinal canal within the stricture. It is better, however, to dilate the strangulation a little more, than to use any force in trying to get the intestine back into the abdomen in the manner just suggested.

Reduction is sometimes impeded by the protruded parts adhering to each other, or to the hernial sac. The intestines are not often found very firmly adherent together. The omentum and inside of the sac are the parts, which are most subject to become intimately connected by adhesions. The fingers will commonly serve for breaking any recent slight adhesions which may have taken place between the intestines and inside of the hernial sac. When these adhesions are firm, and of long standing, they must be cautiously divided with the knife; an object, which can be most easily and safely accomplished, in case they are long enough to permit the intestine to be elevated a little way from the surface of the sac. But, provided their firmness and shortness keep the external coat of the bowel and inner surface of the sac in close contact, the greatest care is requisite in separating the parts with a knife, so as to avoid wounding the intestine. In doing this, the most prudent and safe method, is not to cut too near the bowel, but rather to remove the adherent parts of the sac, and return them with the intestine into the abdomen. Every preternatural connexion should always be separated, before the viscera are reduced: Mr. A. Cooper mentions, that a fatal obstruction to the passage of the intestinal matter has arisen from the mere adhesion of the two sides of a fold of intestine together. (P. 31.) When the adhesions, which prevent reduction, are situated about the neck of the sac, so as to be out of the operator's view, it is the best to make the wound through the skin and abdominal ring somewhat larger, so as to be able to separate the adhesions with more safety.

Having reduced the parts, the operator should introduce his finger, for the purpose of being sure that they are fairly and freely returned into the abdomen, and no longer suffer constriction, either from the inner opening, from the ring, or the parts just within the cavity of the peritonæum.

TREATMENT OF THE OMENTUM.

In an entero-epiplocele, this part, if healthy and free from gangrene, is to be reduced after the intestine. When, however, it is much diseased, thickened, and indurated, as it frequently is found to be, after remaining any considerable time in a hernial sac, the morbid part should be cut off. Its reduction, in this circumstance, would be highly improper, both because an immediate enlargement of the wound would be necessary, in order to be able to put the diseased mass back into the abdomen, and because, when reduced, it would, in all probability, excite inflammation of the surrounding parts, and bring on dangerous symptoms. (See *Hey, p.* 172.)

The diseased omentum should always be cut off with a knife; and, if any of its arteries should bleed, they ought to be taken up with a tenaculum, and tied separately with a small ligature. An unreasonable apprehension of hemorrhage from the cut end of the omentum has led many operators to put a ligature all round this part, just above the diseased

portion, which they are about to remove. This practice cannot be reprobated in terms too severe; for, a frequent effect of it is to bring on a fatal inflammation, and even mortification of the omentum, extending within the abdomen, as high as the stomach and transverse arch of the colon. Mr. A. Cooper has remarked with great truth, that it is surprising, this custom should ever have prevailed. The very object of the operation is to extricate the omentum from its strangulated state, arising from the pressure of the surrounding tendon, and no sooner has this been done, than the surgeon includes it in a ligature, which produces a more perfect constriction, than that which existed before the operation was undertaken.

"When the omentum has suffered strangulation for a few days (says Mr. Lawrence,) it often becomes of a dark red, or livid colour; and there is an appearance, on cutting it, as if some blood were extravasated in its substance. This, I believe, is the state, which surgeons have generally described under the term of gangrene." (P. 167.)

When cut in this state, it does not bleed. I need hardly observe, that the dead part must be amputated, and never reduced. Some have advised leaving the omentum in the wound, especially in cases of old herniæ, in which it has been a long while protruded. Hey mentions cases, shewing that granulations form very well, and the wound becomes firmly healed, when this plan is followed. (P. 180, &c.) Every one, however, will acknowledge the truth of what Mr. Lawrence says on this subject. The method "is attended with no particular advantage, but certainly exposes the patient to the possibility of ill consequences. The omentum, left in the wound, must be liable to injury, inflammation, or disease; and hence arises a source of danger to the patient. Unnatural adhesions, formed by this part, have greatly impaired the functions of the stomach. Cases are recorded, where the unfortunate patient has never been able to take more than a certain quantity of food, without bringing on instant vomiting: and even where it has been necessary for all the meals to be taken in the recumbent position, with the trunk curved, and the thighs bent. (*Gunz.*) To avoid the possibility of such afflicting consequences, we should, after removing any diseased portion, carefully replace the sound part of the omentum in the abdominal cavity." (*Treatise on Hernia*, p. 181.)

TREATMENT, WHEN THE INTESTINE IN THE SAC HAS MORTIFIED.

Sometimes, on opening the hernial sac, the intestine is found to be in a gangrenous state, although the occurrence could not be previously known, owing to the integuments and the hernial sac itself not being affected with the same mischief. In ordinary cases, however, both the skin and sac become gangrenous at the same time with the contents of the hernia. The tumour, which was before tense and elastic, now becomes soft, doughy, emphysematous, and of a purple colour. Sometimes the parts now become spontaneously reduced; but, the patient only survives a few hours.

Mr. A. Cooper has accurately remarked, that, in other instances, the skin, covering the swelling, sloughs to a considerable extent, the intestine gives way, and, as the feces find vent at the wound, the symptoms of strangulation soon subside. When the patient continues to live in these circumstances, the living part of the intestine becomes adherent to the hernial sac, the sloughs separate and come away, and thus an artificial anus is established, through which the feces are commonly discharged, during the remainder of life. (See *Anus, Artificial.*)

However, though when the patient survives the mortification of an intestinal hernia, he commonly obtains the blessings of life only combined with the loathsome affliction of an artificial anus; yet, things sometimes take a still more prosperous course; the feces gradually resume their former route to the rectum, and, in proportion as the artificial anus becomes unnecessary, it is shut up. Many instances of this sort have fallen under my own observation in St. Bartholomew's hospital. The chance of a favourable event is much greater in some kinds of hernia, than in others. When the strangulation only includes a part of the diameter of the gut, the feces are sometimes only partially discharged through the mortified opening. This quantity lessens, as the wound heals, and the patient gets perfectly well. (*Louis; Mem. de l'Acad. de Chir. Tom.* 3.) A small gangrenous spot, or two, may end in the same manner. Mortification of the cæcum and its appendix, in a hernial sac, has happened several times, without much disturbing the usual course of the feces to the anus, and the patients have very soon recovered. (*Med. Obs. and Inq. Vol.* 3, *p.* 162, *&c.*)

The grand thing, on which the establishment of the continuous state of the intestinal canal depends, in all these cases, is the adhesion, which the living portion of the bowel, adjoining the mortified part, contracts with the peritonæum all round. In this manner, the escape of the contents of the bowels into the cavity of the peritonæum becomes in general

completely prevented. When the intestine has not already burst, the stricture should be divided; an opening made in the mortified part to let out the feces, and very mild purgatives and glysters administered. (*Lawrence, p.* 186.)

It is an observation of Mr. A. Cooper's, that the degree of danger, attending an artificial anus, depends on the vicinity of the sphacelated part of the intestinal canal to the stomach. Thus, if the opening be in the jejunum, there is such a small extent of surface for absorption, between it and the stomach, that the patient dies of inanition.

Let us now suppose, that the mortified state of the intestine has only been discovered, after laying open the hernial sac in the operation. The mischief may only consist of one, or more spots; or of the whole diameter of the protruded bowel. In the first case, the proper practice is to divide the stricture, and return the intestine into the abdomen, with the mortified spots towards the wound. Mild purgatives and glysters are then to be exhibited. The most favourable mode, in which a case of this kind ends, is, when the intestinal matter gradually resumes its natural course, after being either partly, or entirely discharged from the wound. But, sometimes, an artificial anus continues for life.

The repeated observations of modern surgeons have now decided, that no ligature, passed through the mesentery, to keep the gangrenous part of the bowel near the wound, is at all necessary. The parts, in the neighbourhood of the ring, have all become adherent together, in consequence of inflammation, at the same time, that the parts in the hernial sac mortify; and, of course, the partially gangrenous bowel, when reduced, is mechanically hindered, by these adhesions, from slipping far from the wound. Desault and De la Faye, both confirm the fact, that the intestine never recedes far from the ring; and, even were it to do so, the adhesions, which it soon contracts to the adjacent surfaces, would, as Petit has explained, completely circumscribe any matter, which might be effused, and hinder it from being extensively extravasated among the convolutions of the viscera. (*Mem. de l'Acad. de Chir. Tom.* 1 *and* 2.)

Mr. Lawrence, in his late very valuable Treatise on Hernia, has clearly shewn the impropriety of sewing the ends of the intestinal canal together, introducing one within the other, supported by a cylinder of isinglass, &c. put in their cavity, in those cases, in which the whole circle of the intestine has mortified, and been cut away, as is advised by the majority of writers. "By drawing the intestine out of the cavity, in order to remove the dead part, the adhesion behind the ring, on which the prospect of a cure chiefly depends, must be entirely destroyed; and new irritation and inflammation must be unavoidably produced, by handling and sewing an inflamed part."—(P. 199.)

Instead of such practice, this gentleman very judiciously recommends dilating the stricture, and leaving the subsequent progress of the cure entirely to nature. The sloughs will cast off, and the ends of the gut are retained by the adhesive process in a state of apposition to each other, the most favourable for their union. Thus, there is a chance of the continuity of the intestinal canal becoming established again.

However, in recent wounds of the abdomen, attended with a protrusion of a portion of the intestine, cut completely across, the bowel is as yet neither inflamed, nor adherent to the vicinity of wound in the peritonæum, so that, in these cases, it may be proper practice to connect the ends together, (as advised in the article *Abdomen, Wounds of the Intestines,*) by means of a few stitches with silk, or thread, and a small sewing needle; and to confine the wounded part of the intestine, near the breach in the peritonæum, until adhesions have had time to form.

Mr. A. Cooper has recommended this mode of proceeding in cases of hernia, attended with mortification of the whole diameter of the bowel; but, for reasons already stated, and many facts, referred to in Mr. Lawrence's work, it is to be hoped, that the plan of sewing the intestines in these cases will be for ever abandoned.

OPERATION FOR VERY LARGE INGUINAL HERNIÆ.

When the tumour is of very long standing, is exceedingly large, perhaps extending half way down to the knees, and its contents have never admitted of being completely reduced, the indication is to divide the stricture, provided a strangulation takes place; but without laying open the hernial sac, or attempting to reduce the parts.

The reasons, against the common plan of operating, under such circumstances, are, the difficulty of separating all the old adhesions; the hazardous inflammation, which would be excited by laying open so vast a tumour, and the probability that parts, so long protruded, might even bring on serious complaints, if reduced. J. L. Petit, and afterwards, Dr. Monro, advised the sac not to be opened in operating on certain cases. (See *Mal. Chir.*

Tom. 2, p. 372. Description of Bursæ Mucosæ.)

OPERATION FOR THE HERNIA, WHEN IT IS SO SMALL THAT IT DOES NOT PROTRUDE EXTERNALLY THROUGH THE RING.

In this kind of case, there is little appearance of external tumour; consequently, the disease is very apt to be overlooked by the patient and surgeon, and some other cause assigned for the series of symptoms. The manner of operating, in this form of the disease, differs from that in the common scrotal hernia; the incision is to be made parallel to the direction of the spermatic cord, and the stricture will be found at the internal ring. (*A. Cooper on Inguinal Hernia.*)

TREATMENT AFTER THE OPERATION.

Evacuations from the bowels should be immediately promoted by means of glysters, oleum ricini, or small doses of any of the common salts, dissolved in peppermint-water. For some time, the patient must only be allowed a low diet. When symptoms of inflammation of the bowels and peritonæum threaten the patient, general bleeding, leeches applied to the abdomen, fomentations, the warm bath, blisters, doses of the oleum ricini, and glysters, are the means deserving of most dependence, and should be resorted to, without the least delay. When all the danger of peritoneal inflammation is past, and the patient is very low and weak, bark, wine, cordials, and a generous diet, must be directed. The effervescing saline draught, with opium, is the best medicine for quieting sickness, after the operation. Opium and cordials are the most eligible for checking diarrhœa. As the operation does not usually prevent the parts from becoming protruded again, a truss must be applied before the patient gets up again, and worn constantly afterwards.

PROPOSALS FOR THE RADICAL CURE OF THE BUBONOCELE.

We shall just mention the principal plans for this purpose; some of them are perfectly absurd and cruel; others may deserve more extensive trial. Of castrating the patient, applying caustic, or of the operation of the punctum aureum, with this view, I need only say, that they are barbarous, and not at all adapted for the attainment of the desired end. A description of these methods may be found in Paré, Wiseman, &c.

The old operation, termed the *royal stitch*, seems one of the most justifiable. It consisted in putting a ligature, under the neck of the hernial sac, close to the abdominal ring, and then tying it, so as to produce an obliteration of the pervious state of the part, by the adhesive inflammation thus excited. An incision, about two inches long, would be quite large enough for getting at the neck of the sac, which must next be separated from the parts covering it on each side, with a few sweeps of the knife. A single ligature might then, with the aid of a needle, be passed immediately under it, and between it and the spermatic vessels, close to the ring, and then firmly tied, just as surgeons tie an artery. This operation is applicable to reducible hernia. One would not expect *à priori*, that any dangerous constitutional symptoms would be likely to follow so small a wound, or making a ligature on a part of such little importance as a hernial sac. After performing the common operation for the relief of a strangulated bubonocele, might not this opportunity be taken, to learn whether a radical cure would not more frequently be accomplished, than is at present the case?

The royal stitch, performed in this manner, has actually been attended with success. (*Heister, Vol. 2.*) The umbilical rupture was cured by Saviard, on similar principles; and Desault radically cured nine cases of the exomphalos in children, by tying the hernial sac.

Schmucker cured two irreducible ruptures, free from strangulation, by cutting away the body of the sac, after tying its neck. (*Chirurgische Wahrnehmungen, Vol. 2.*) Mr. A. Cooper found, cutting away the sac alone insufficient, in one case.

Dissecting away the whole hernial sac, or even laying it open, must be a formidable operation, compared with the simple mode above related. Such severe proceedings would also be quite useless, if the hernia were reducible, and the neck of the sac could be rendered impervious by the ligature. Perhaps the cases recorded by Petit, Sharp, Acrell, &c. against attemping a radical cure, have no real validity against the royal stitch done in the simple way above described, as none of these surgeons operated in this manner.

Richter recommends scarifying the neck of the sac, with a view of producing an adhesion of its sides to each other; a plan which, he says, he has found very successful. It certainly seems free from danger; but, perhaps, not more so than tying the part; and, one would expect, less likely to be always successful.

From the account we have given of the anatomy of the bubonocele, it is obvious, however, that all these methods could only obliterate the sac as high as the ring, not more inwardly to the inner opening.

Hence there would still remain a certain portion of the entrance of its cavity open for the descent of the viscera.

CRURAL, OR FEMORAL HERNIA.

Verheyen, who wrote in 1710, first demonstrated the distinct formation of crural hernia, which was before generally confounded with bubonocele.

The parts composing this kind of hernia, are always protruded under Poupart's ligament, and the swelling is situated towards the inner part of the bend of the thigh. The rupture descends on the inside of the femoral artery and vein, between these vessels and the os pubis. Females are particularly subject to this kind of rupture, in consequence of the great breadth of their pelvis, while in them the inguinal hernia is rare. It has been computed, that nineteen out of twenty married women, afflicted with hernia, have this kind; but, that not one out of a hundred unmarried females, or out of the same number of men, have this form of the disease. (*Arnaud.*)

"The crural hernia," says Scarpa, "is frequently observed in women, who have had several children; it very seldom afflicts young girls; and still more rarely men. In the latter, the viscera can more easily escape through the inguinal ring, by following the spermatic cord, than they can descend along the crural vessels, and raise the margin of the aponeurosis of the external oblique muscle, that forms the crural arch. In women, an opposite disposition prevails, in consequence of the smallness of the inguinal ring, which, in them, only gives passage to the round ligament of the uterus, and besides is situated lower down, and nearer the pubes, than it is in men, whilst, on the contrary, the crural arch is more extensive, by reason of the wider form of the pelvis. Morgagni expressly says, that he has never met with the crural hernia in the dead body of any male subject. *Mihi ut verum fatear, nondum nisi in fœminis accidit ut eam viderem.* (*De Sed. et caus. morb. Epist.* 34—15.) Camper gives us to understand almost the same thing. (*Icones Herniarum, in Præfat.*) Hévin often operated for this kind of hernia in females, but only once in the male subject. (*Pathol. et Therap. p.* 406.) Sandifort and Walter have both seen but a single instance of it in the dead body of the male subject. (*Obs. Anat. Pathol. cap.* 4, *p.* 72. *Sylloge comment. anat. p.* 24, *obs.* 21.) Arnaud himself, to whom modern surgery is highly indebted for many important precepts on the operation for the strangulated crural hernia in both sexes, candidly confesses, that he never had an opportunity of dissecting a hernia of this kind in the male subject." (*Scarpa, Traité des Hernies, p.* 201.)

Scarpa happened to have at his disposal the dead body of a man affected with a crural hernia, and, he availed himself of the opportunity of examining the parts with the utmost care. He first injected the blood-vessels; he afterwards attentively dissected all the parts concerned in the disease, and, in his valuable treatise, he has published an exact description of all the particulars, accompanied with an engraving. Plate 8.

But, though the occasional occurrence of the crural hernia in men is fully proved, it is chiefly in women, that this form of disease is met with.

According to the observations of Scarpa, and all the best modern writers upon surgery, the crural hernia forms, both in the male and female subject, in the cellular substance, which accompanies the crural vessels below Poupart's ligament. The swelling follows the internal side of those vessels, and gradually descends into the fold of the thigh, between the sartorius, gracilis, and pectineus muscles. "Many surgeons believe, (says Scarpa,) that the hernial sac, and the intestines, which it contains, are ordinarily situated above the crural vessels and trunk of the vena saphena, and sometimes between these vessels and the anterior superior spine of the ilium. But, as far as my knowledge extends, this assertion is not supported by a single accurate description of a crural hernia in the early stage. It is true, that when the tumour has in time acquired a large size, and its fundus is inclined in a parallel manner to the fold of the thigh, it partly or entirely covers the crural vessels, and even the crural nerve, as Walter says he once observed. (*Sylloge comment. anat. p.* 24.) But, it is not thence to be concluded, that the tumour in the beginning descended over the crural vessels, much less betwixt them and the anterior superior spinous process of the ilium. Neither must it be imagined, that the neck of the hernial sac becomes removed from the inner to the outer side of these vessels. If these two cases ever happen, they must be very rare; and the best authors, who have treated of the crural hernia, concur in stating, that in performing the operation, they have constantly found the viscera situated on the inside of the crural vessels, but never on their outside. Even when the tumour, after acquiring a considerable size, was situated transversely over the crural vessels, the neck of the hernial sac has always been found upon their inner side, that is to say, between them and the pubes. Le Dran, (*Observ. de Chir. Tom.* 2, *p.* 2.), La Faye, (*Cours d'Opérations de Dionis, p.* 358.), Petit,

(*Œuvres Posthumes, Tom.* 2, *p.* 219.), Morgagni, (*De Sed. et Caus. Morb. epist.* 34—15.), Arnaud, (*Mem. de Chir. Tom.* 2, *p.* 768.), Gunz, (*De Herniis libellus, p.* 78.), Bertrandi, (*Trattato delle Operazioni, Tom.* 1, *annot. p.* 218.), Pott, (*Chirurg. Works, Vol.* 2, *p.* 152), Desault, (*Traité des Mal. Chirurg. p.* 191—195), B. Bell, (*A System of Surgery, Vol.* 1, *p.* 387), Richter, (*Traité des Hernies, chap.* 34), Nessi, (*Institut. Chirurg. Tom.* 2, *p.* 198), Lassus, (*Med. Oper. Tom.* 1, *p.* 198), and many other writers, all concur upon this point. In support of their opinion (says Scarpa) I could cite a great number of cases of my own, which I have collected either in operating on several individuals for crural hernia, or in dissecting the same kind of hernia in the bodies of many female subjects, and in that of the man, from whom I have taken the plate. Lastly, also, having had an opportunity of dissecting in a female an enormous crural hernia, which descended one-third of the way down the thigh, I observed, that the neck of the sac did not encroach at all upon the crural vessels, but lay entirely on their inner side." (*Scarpa, Traité des Hernies, p.* 203—206.)

The situation of the tumour makes it liable to be mistaken for an enlarged inguinal gland; and many fatal events are recorded to have happened from the surgeon's ignorance of the existence of the disease. A gland can only become enlarged by the gradual effects of inflammation; the swelling of a crural hernia comes on in a momentary and sudden manner, and, when strangulated, occasions the train of symptoms already described in our account of the inguinal hernia, which symptoms an enlarged gland could never occasion. Such circumstances seem to be sufficiently discriminative; though the feel of the two kinds of swelling, is often not of itself enough to make the surgeon decided in his opinion. A femoral hernia may be mistaken for a bubonocele, when the expanded part of the swelling lies over Poupart's ligament. As the taxis and operation for the first case ought to be done differently from those for the latter, the error may lead to very bad consequences. The femoral hernia, however, may always be discriminated, by the neck of the tumour having Poupart's ligament above it. In the bubonocele, the angle of the pubes is behind and below this part of the sac; but, in the femoral hernia, it is on the same horizontal level, and a little on the inside of it. (*Lawrence, p.* 218.)

In the male subject, "the crural hernia, in the early stage, (says Scarpa) is situated so deeply in the bend of the thigh, that it is difficult, even in the thinnest persons, to feel its neck, and in examining its circumference with the extremity of the finger, the tendinous margin of the opening, through which the parts are protruded, can only be perceived with considerable difficulty. On the contrary, the inguinal hernia, however small it may be, is always less deeply situated: it is about half an inch above the bend of the thigh. In carrying the finger round its neck, the tendinous margin of the inguinal ring can be easily felt at its circumference; and at the posterior part of the small tumour, the cord composed of the spermatic vessels is distinguishable. When the crural hernia has acquired a considerable size, its neck is always deeply situated in the bend of the thigh; but, its body and its fundus have assumed an oval form, and their great diameter is situated transversely in the bend of the thigh. Whatever may be the size of the inguinal hernia, it always presents a tumour of a pyramidal form, the base or fundus of which, far from being directed towards the ilium, follows exactly the direction of the spermatic cord, and descends directly into the scrotum. It may also be added, that, besides the symptoms, common to all hernial swellings, the crural hernia, when it has attained a certain size, presents some others, which are peculiar to it, such as a sense of stupor and heaviness in the thigh, and œdema of the leg, and even, of the foot of the same side.

"In women, however, it is less easy to distinguish the crural hernia from the inguinal. In fact, the absence of the spermatic cord, and the nearer situation of the ring to the crural arch, may easily occasion a mistake. Sometimes, a woman may even be supposed to have a double crural hernia of the same side, whilst, of these two distinct, though neighbouring herniæ, one may be inguinal, and the other crural. Arnaud (*Mém. de Chir. Tom.* 2, *p.* 605,) relates an instance of such a mistake." (*Scarpa, Traité des Hernies, p.* 207—208.)

This interesting writer takes occasion to observe further, upon this part of the subject, that the portion of the inferior pillar of the abdominal ring, which separates this opening from the internal and inferior angle of the crural arch, is so slender in women, that it is sometimes hard to distinguish the crural from the inguinal hernia, which is not the case in male patients.

Until very lately, the stricture, in cases of femoral hernia, was always supposed to be produced by the lower border of the external oblique muscle, or, as it is termed, Poupart's ligament. A total change of surgical opinion on this subject, has, however, latterly taken place, in

consequence of the accurate observations first made in 1768, by Gimbernat, surgeon to the king of Spain. "In the crural hernia, (says he) the aperture through which the parts issue, is *not* formed by two bands, (as in the inguinal hernia) but it is a foramen almost round, proceeding from the internal margin of the crural arch (Poupart's ligament), near its insertion into the branch of the os pubis, between this bone and the iliac vein; so that, in this hernia, the branch of the os pubis is situated more internally than the intestine, and a little behind; the vein, externally, and behind; and the internal border of the arch, before. Now it is this border which always forms the strangulation." (See *A new Method of Operating for the Femoral Hernia, by Don Antonio de Gimbernat, p. 6. Trans. by Beddoes.*)

Mr. Hey, who attempted to describe some anatomical circumstances, relative to the femoral hernia, and wrote subsequently to Gimbernat, has certainly rather obscured, than thrown any light upon this part of the subject. The inconsistencies and perplexities of his description, have been clearly explained by M. Lawrence, to whose treatise I shall refer the reader. The latter gentleman makes the ligament described by Gimbernat, perfectly intelligible, in a few words: when Poupart's ligament approaches the pubes, he states that it becomes suddenly broader; that it is fixed by this broad portion, along the whole length of the angle and crista of the pubes; that it has a rounded and strong anterior edge, a thin and sharp posterior margin; and that the former of these is nearer to the surface, while the latter is comparatively deeply seated. The breadth of this part varies, in different subjects: it is generally from three quarters of an inch to an inch. Sometimes, as Gimbernat has stated, it measures more than an inch. Dr. Monro has observed, that it is broader in the male than in the female subject; and, from this structure, he explains in part the more rare occurrence of this rupture in the male." (P. 220.)

The great utility of knowing, that it is this part, which produces the strangulation, in cases of femoral hernia, is immense; for we then know, that cutting the lower and outer border of the external oblique muscle, (in other words, Poupart's ligament) is quite erroneous. This proceeding is the more to be reprobated, because the lower pillar of the abdominal ring, in both sexes, will be divided by directing the incision upward, or upward and inward; and thus the abdominal and crural rings, are made into one common aperture, large enough to make the future occurrence of hernia very likely to happen. In the male, also, there is considerable danger of the spermatic cord being cut. Cutting Poupart's ligament obliquely outwards, is attended with still more danger; for the epigastric artery will be infallibly divided at its origin. With all these hazards, the cutting of Poupart's ligament is quite useless, unless the incision be carried on to the internal edge of the crural arch. (*Gimbernat, p.* 16.)

Mr. B. Bell, has the merit of having proposed the safest plan of cutting Poupart's ligament, before surgeons were aware of the part which really formed the strangulation: he introduced his finger below Poupart's ligament, between the ligament and the intestine, (an evident proof, says Gimbernat, very truly, that there was no strangulation there;) he then made a very superficial incision from above downwards, into the thickest part of the ligament to its lower edge; and, without cutting quite through it, he continued his incision about an inch. He rested the back of the scalpel upon his finger, which served as a guide to the instrument, and, at the same time, as a defence to the intestine. The incision, however, having been continued for an inch, would, as Gimbernat remarks, inevitably cut the internal edge of the crural arch. Now, cutting this, only for a few lines, gives sufficient room for the easy reduction of the parts, and there is no necessity to touch the ligament, as it never occasions the strangulation.—(*Gimbernat, p.* 27.)

The iliacus internus muscle is covered by a thin fascia, called by Mr. A. Cooper, *fascia iliaca*. This is closely connected with the tendon of the psoas parvus, and is inserted into the posterior edge of Poupart's ligament, as far as where the crural vessels pass under this part. It is this fascia which prevents any protrusion of the viscera, on the outside of these vessels. But between the iliac vein, the thin posterior, deep-seated, edge of Poupart's ligament, and the os pubis, a space exists, at which the femoral hernia makes its descent. Sometimes, at this point is situated a lymphatic gland; sometimes only cellular substance.

The fascia lata is not inserted into the whole length of Poupart's ligament; that is, not nearer the pubes than the femoral vessels. Here it is continued over the pectineus muscle; consequently has no connexion with the thin edge of the crural arch, nor with Poupart's ligament opposite the space, left between the vein and that thin margin. (*Lawrence, p.* 226.)

Where the insertion of the fascia lata into Poupart's ligament ends, it forms what Mr. Burns of Glasgow calls the *falciform process*, the upper part of which

is attached to the above ligament, while the lower proceeds further down the thigh. Its convexity faces the pubes. This anatomical connexion is one chief cause, why extending the thigh, and rotating it outward, should make the crural arch tense.

Gimbernat named the place where the femoral hernia protrudes the *crural*; Hey, the *femoral ring*.

The hernia, being situated in front of the pectineus, must of course be exterior to the fascia lata. In my opinion, surgeons are very much indebted to Mr. Lawrence for his able explanation of this fact. As for myself, I am candid enough to own that, until I read his clear and concise account of the anatomy of the crural hernia, I could never reap any accurate notions, concerning the relative situations of the hernial sac and fascia of the thigh, from other more prolix works. This gentleman reminds us, however, that the particular crural hernia, contained in the sheath of the femoral vessels, lies under the fascia; p. 230. Mr. Lawrence describes, that, "the falciform process of the fascia lata, passes along the upper and outer part of the tumour. The iliac vein is placed on the outer side of the neck of the sac; the pubes is directly behind it; and the upper and inner parts are bounded by the thin posterior edge of Poupart's ligament." The falciform process seems to have some inferior share in producing the strangulation; the chief part of which is formed, as Gimbernat first pointed out, by the thin posterior edge of the crural arch.

The sac of the femoral hernia is exceedingly narrow at its neck; and, where its body begins, it becomes expanded in a globular form: the sac of the bubonocele is generally of an oblong shape. The body of the sac of the femoral hernia, makes a right angle with the neck, by being thrown forward and upward, a circumstance very necessary to be known in trying to reduce the parts by the taxis.

The sac of the femoral hernia is covered by a kind of membranous expansion, consisting of condensed cellular substance, and named by Mr. A. Cooper, the *fascia propria*. According to this gentleman, another covering extends over the swelling, from the superficial fascia of the bend of the thigh. It is of infinite use to remember these circumstances in operating, lest one should think the hernial sac divided, when it is not so.

All late writers on hernia, have remarked how very small the aperture is, through which the viscera protrude in the femoral rupture; how much greater the constriction generally is, than in the bubonocele; consequently, how much more rapid the symptoms are; how much less frequently the taxis succeeds; and how much more dangerous delay proves. (See *A. Cooper, Hey, Lawrence, &c.*)

Though the crural ring is almost always very small, yet in a few instances, in which the tumour is very large, and of long standing, it becomes very capacious, just as the opening often becomes, through which the inguinal hernia protrudes. Dr. Thomson, of Edinburgh, Mr. Hey, and Mr. Lawrence, have related examples of this kind.

The remarks already made, concerning the treatment of hernia, before having recourse to the knife, are all applicable to the present case, and we need not repeat them. In attempting to reduce the femoral hernia by the taxis, the surgeon should recollect, however, that relaxing Poupart's ligament, and the femoral fascia, is of the highest consequence. Hence, the thigh should be bent, and rolled inwards. The pressure ought also to be first made downwards and backwards, in order to push the swelling off Poupart's ligament; and afterwards, the parts should be propelled upwards, so as to try to get them through the crural ring.

OPERATION FOR THE FEMORAL, OR CRURAL HERNIA.

Mr. A. Cooper says, "the incision of the integuments is to be begun an inch and a half above the crural arch, in a line with the middle of the tumour, and extended downwards to the center of the tumour below the arch. A second incision, nearly at right angles with the other, is next made, beginning from the middle of the inner side of the tumour, and extending it across to the outer side, so that the form of this double incision will be that of the letter T reversed." The angular flaps are, of course, to be next dissected off, and reflected.

The making of two incisions, however, is not deemed necessary by the majority of surgeons; and, in all the numerous operations I have seen performed by the surgeons of St. Bartholomew's Hospital, during a space of nearly fifteen years, I never knew them have any occasion to make any transverse wound. The division of the skin should begin about an inch above the crural ring, and be continued obliquely downwards and outwards. In this manner, we cut exactly over the place, where the incision of the stricture should be made.

"The first incision (says Mr. A. Cooper) exposes the superficial fascia, which is given off by the external oblique muscle, and which covers the anterior part of the hernial sac; but, if the patient is thin, and the hernia has not been long formed, this fascia escapes observation,

as it is then slight and delicate, and adheres closely to the inner side of the skin. When this fascia is divided, the tumour is so far exposed, that the circumscribed form of the hernia may be distinctly seen; and a person, not well acquainted with the anatomy of the parts, would readily suppose that the sac itself was now laid bare. This, however, is not the case, for it is still enveloped by a membrane, which is the fascia, that the hernial sac pushes before it, as it passes through the inner side of the crural sheath. This membrane, the fascia propria, is to be next divided longitudinally from the neck to the fundus of the sac; and if the subject is fat, an adipose membrane lies between it and the sac, from which it may be distinguished, by seeing the cellular membrane passing from its inner side to the surface of the sac.

"This is, in my opinion, the most difficult part of the operation; for the fascia propria is very liable to be mistaken for the sac itself; so that, when it is divided, it is supposed that the sac is exposed, and the intestine is laid bare: following upon this idea, the stricture is divided in the outer part of the sac, and the intestine, still strangulated, is pushed, with the unopened sac, into the cavity of the abdomen.

"The hernial sac being exposed, is to be next opened; and, to divide it with safety, it is best to pinch up a small part of it between the finger and thumb; to move the thumb upon the finger, by which the intestine is distinctly felt, and may be separated from the inner side of the sac; and then to cut into the sac, by placing the blade of the knife horizontally. Into this opening, a director should be passed, and the sac opened from its fundus to the crural sheath." (*A. Cooper on Crural and Umbilical Hernia.*)

Sometimes the contents of the hernia, thus exposed, admit of being returned, without the further use of the knife. When this object, however, cannot be readily done, the protruded parts should never suffer injury in repeating manual attempts; and it is safest to divide the stricture at once.

Gimbernat's method of dividing the stricture, in cases of femoral herniæ, may be regarded as the most effectual, and safest. "Introduce, along the internal side of the intestine, a cannulated or grooved sound, with a blunt end, and a channel of sufficient depth. This is to be directed obliquely inwards, till it enter the crural ring, which will be known by the increased resistance; as also when its point rests upon the branch of the os pubis. Then suspend the introduction; and keeping the sound (with your left hand, if you are operating on the right side, and v. v.) firmly resting upon the branch of the os pubis, so that its back shall be turned towards the intestine, and its canal to the symphysis pubis, introduce gently with your other hand, into the groove of the sound, a bistoury, with a narrow blade and blunt end, till it enter the ring. Its entry will be known, as before, by a little increase of resistance. Cautiously press the bistoury to the end of the canal: and employing your two hands at once, carry both instruments close along the branch to the body of the pubis, drawing them out at the same time. By this easy operation, you will divide the internal edge of the crural arch at its extremity, and within four or five lines of its duplicature; the remainder continuing firmly attached, by the inferior band, or pillar, of which it is the continuation. This simple incision being thus made, without the smallest danger, the internal border of the arch, which forms the strangulation, will be considerably relaxed, and the parts will be reduced with the greatest ease." (*Gimbernat, p.* 45, 46.)

Mr. A. Cooper recommends the stricture to be divided "obliquely inwards and upwards, at right angles to the crural arch."

After advising us to open the sac of a femoral hernia with particular care, on account of its being much thinner than that of a bubonocele, and (as might be added) on account of its seldom containing any fluid, and often having no omentum in it covering the intestine, Mr. Hey remarks, "The stricture made upon the prolapsed parts is very great, as I have already observed; but if the tip of the finger can be introduced within the femoral ring, to guide the bubonocele knife, a small incision (for the ring is narrow) will be sufficient to set the parts at liberty. If the tip of the finger cannot be introduced at the proper place, a director with a deep groove must be used instead of the finger; but I prefer the latter. The finger, or director, should not be introduced very near the great vessels; but on that side of the intestine or omentum which is nearest to the symphysis of the ossa pubis. *The incision may then be made directly upwards.* The surgeon must take especial care to introduce his finger or director within that part where he finds the stricture to be the greatest, which, in this species of hernia, is the most interior part of the wound." (*P.* 155.)

Gimbernat's mode is preferable to Mr. Hey's, because, were the operation done on a male, cutting directly upward would endanger the spermatic cord.

Mr. Lawrence has noticed, "an inci-

sion of the most interior part of the stricture is free from all danger, in the ordinary course of the vessels. But that variety, in which the obturator artery, arising from the epigastric, runs along the inner margin of the sac, seems to preclude us from cutting even in this direction. A mode of operating has been lately proposed, (*Edinb. Med. and Surg. Journal, Vol.* 2, 205.) with a view of avoiding this danger. We are directed to make an incision through the aponeurosis of the external oblique muscle, just above the crural arch, and in a direction parallel to that part: to introduce a director under the stricture from this opening, and to divide the tendon to the requisite extent, by means of a curved knife, passed along the groove." (*Treatise on the Hernia, p.*247.) For reasons which Mr. Lawrence states, this plan is certainly not altogether eligible, and, upon the whole, Gimbernat's method of cutting the stricture is the safest. Monro computes, that the obturator artery may arise from the epigastric, once in twenty-five or thirty subjects. But, allowing that it originates more frequently, it then does not always deviate from its usual course along the outside of the sac. Mr. A. Cooper says: "in all cases, which I have myself dissected, where this variety existed with crural hernia, the obturator has passed into the pelvis, on the outer side of the neck of the sac, entirely out of the reach of any danger of the knife." (*On Crural Hernia, p.* 21.) Mr. Lawrence concludes, that the comparative number of instances, in which it is found on the opposite side, cannot be more than one out of eight, or ten, and consequently it would only be liable to be wounded once in eighty or one hundred operations. (*P.* 252.)

It is observed by professor Scarpa, that "the round ligament of the uterus, in passing through the abdominal muscles, follows precisely the same track as the spermatic cord. It is equally situated behind Poupart's ligament, with the difference, that it does not become so distinct from the internal extremity of this ligament, as the spermatic cord does, because it has not so far to run, in order to get from that ligament to the inguinal ring, the latter opening being situated lower in the female, than the male subject. The round ligament, like the spermatic cord, also crosses the epigastric artery, before reaching the inguinal ring. And as the crural hernia always begins at the internal and inferior angle of the arch of this name, as well in the male as the female, it follows, that, in the two sexes, the epigastric artery remains in its natural situation, and invariably corresponds to the external side of the neck of the crural hernia; whilst the spermatic cord, in man, and the round ligament, in women, pass over the extremity of the front of the neck of the hernial sac. In the operation for the crural hernia, in females, the incision of the neck of the hernial sac, and crural arch, when directed upward towards the linea alba, cannot wound the epigastric artery, which it is of the most consequence to avoid; but it always divides, either totally or partially, the round ligament of the uterus, which cannot lead to any dangerous hemorrhage; for, out of the period of pregnancy, the arteries of the round ligament are very small; they are almost obliterated in women advanced in years; and in general, they are quite capillary in the extremity of the ligament adjoining the ring. Hence, it cannot be surprising, that so many crural herniæ have been successfully operated upon in women, by cutting the hernial sac and crural arch directly upward, while not a single instance can be cited of such an incision being made in man without any ill consequence, although in both sexes, the epigastric artery may have been avoided in operating by this process." (*Scarpa, Traité des Hernies, p.* 240.)

In operating for the crural hernia in males, Scarpa recommends us to follow a method, which he calls new, but which in fact is the same as that advised by Gimbernat. "I have found (says Scarpa) that, in man, the neck of the hernial sac may be divided without danger, by giving to the incision a direction exactly contrary to that, which is practised, in the female subject. After having opened the hernial sac, it is to be drawn outward by one of its sides sufficiently to allow the introduction of a small director between its neck and the strangulated intestine, *the groove of the instrument being turned downwards towards the internal and inferior angle of the crural arch. A probe-pointed bistoury, the edge of which is also to be directed downwards towards the point of insertion of Poupart's ligament to the pubes, is to be pushed along the groove. By this means, the neck of the hernial sac will be divided its whole length, at its internal and inferior side, and Poupart's ligament will be cut close to its attachment to the top of the os pubis.* The epigastric artery will be certainly avoided, because it lies upon the opposite side of the hernial sac. As for the spermatic cord, I have demonstrated, that it is situated on the forepart of the neck of the hernial sac; consequently, it cannot be touched by an incision made from above downwards, whilst it is constantly cut in the ordinary method, since the knife is carried from below upwards. In the first case, this part may be the more

easily avoided, as it lies at some distance from the internal and inferior angle of the crural arch. In fact, it is at this place, that it quits, as we have seen, the edge of Poupart's ligament, in order to ascend towards the inguinal ring. The incision, that I propose (says Scarpa) not only has the advantage of slitting open the neck of the hernial sac its whole length, it also divides a part of the insertion of Poupart's ligament into the upper part of the os pubis, a thing, that greatly contributes to relax the crural arch, and facilitate the reduction of the viscera; of those, at least, which are not adherent to the sac." (*Scarpa, Op. cit. p.* 235.)

Although this accurate anatomist and surgeon appears to be quite unacquainted with many of the late valuable publications on hernia, which have made their appearance in this country, it is curious to find, both in his account of the inguinal and crural hernia, how strongly his doctrines and observations tend to confirm every thing that has recently been insisted upon in modern works, respecting the place where the bubonocele first protrudes, its passing through a sort of canal before it comes out of the abdominal ring, the advantage of cutting in the crural hernia the internal and inferior angle of Poupart's ligament, or, in other terms, that part of the ligament, which was first particularly pointed out by Gimbernat, as causing the principal part of the strangulation, and about which so much has been said by Mr. A. Cooper, Mr. Hey, &c.

CONGENITAL HERNIA.

Before the beginning of the sixth month of the fœtal state, the testicle is situated near the kidney, where it receives a covering from the peritonæum, just like the other abdominal viscera. Between the beginning of the sixth month, and end of the seventh, the testicle has either descended as low as just above the abdominal ring, or else is passing through it, or just below it. (*Wrisberg. Comm. Reg. Societ. Gotting.* 1578.)

When the testicle passes through the abdominal ring into the scrotum, it carries before it a production of the peritonæum, which afterwards constitutes the tunica vaginalis; while that peritoneal investment, which was given to the testicle in the loins, is closely adherent to this body, and forms what is named the tunica albuginea.

After the descent of the testicle into the scrotum, the communication between the cavity of the tunica vaginalis and that of the abdomen, commonly becomes obliterated, which latter event is usually effected before birth, sometimes not till afterwards, and in a few subjects, even as late as the adult state.

In the congenital hernia, the protruded viscera are situated in the tunica vaginalis, in contact with the testicle; having descended into this position before the closure of the communication with the abdomen. Of course, the tunica vaginalis itself is the hernial sac. The nature of this case was not understood, before it was elucidated by Haller in 1755, and the two Hunters in 1762 and 1764. (See *Hunter's Med. Comment.*; *Haller's Opuscula Patholog. and Opera Minora, Tom.* 3.) Before that period, surgeons imputed the circumstance of the contents of the hernia and testicle being in contact, to the former parts having made their way, by laceration, through the tunica vaginalis, from the ordinary hernial sac of a bubonocele. The old surgeons, indeed, frequently cite this instance, in proof of their doctrine, that some herniæ were attended with a laceration of the peritonæum. (See *Sharp's Enquiry.*)

From the term *congenital*, we might suppose, that this hernia always existed at the time of birth. The protrusion, however, seldom occurs till after this period, on the operation of the usual exciting causes of herniæ in general. The congenital hernia does not usually happen till some months after birth; in some instances, not till a late period. Mr. Hey relates a case, in which a hernia congenita was first formed in a young man, aged sixteen, whose right testis had, a little while before the attack of the disease, descended into the scrotum. It seems probable, that in the cases of hernia congenita, which actually take place when the testicle descends into the scrotum before birth, the event may commonly be referred to the testicle having contracted an adhesion to a piece of intestine, or of the omentum, in its passage to the ring. Wrisberg found one testicle, which had not passed the ring, adhering, by means of a few slender filaments, to the omentum, just above this aperture, in an infant, that died a few hours after birth.

Excepting the impossibility of feeling the testicle in hernia congenita, as we can in most cases of bubonocele, (which criterion Mr. Pott should have mentioned,) the following account is very excellent. "The appearance of a hernia in very early infancy, will always make it probable that it is of this kind; but, in an adult, there is no reason for supposing his rupture to be of this sort, but his having been afflicted with it from his infancy; there is no external mark, or

character, whereby it can be certainly distinguished from one contained in a common hernial sac; neither would it be of any material use in practice, if there was.

"When returnable, it ought, like all other kinds of ruptures, to be reduced, and constantly kept up by a proper bandage; and when attended with symptoms of stricture, it requires the same chirurgic assistance as the common hernia.

"In very young children, there are some circumstances, relative to this kind of rupture, which are very well worth attending to, as they may prove of very material consequence to the patient.

"A piece of intestine, or omentum, may get pretty low down in the sac, while the testicle is still in the groin, or even within the abdomen; both which I have seen. In this case, the application of a truss would be highly improper; for in the latter, it might prevent the descent of the testicle from the belly into the scrotum; in the former, it must necessarily bruise and injure it, give a great deal of unnecessary pain, and can prove of no real use. Such bandage, therefore, ought never to be applied on a rupture in an infant, unless the testicle can be fairly felt in the scrotum, after the gut or caul is replaced; and when it can be so felt, a truss can never be put on too soon.

"As this kind of rupture is subject to stricture, with all its consequences, as much as that which is contained in a common hernial sac, and therefore liable to stand in need of the chirurgic operation; it may be very well worth an operator's while to know, that an old rupture, which was originally congenial, is subject to a stricture made by the sac itself, independent of the abdominal tendon, as well as to that made by the said tendon.

"Whether this be owing to the weight of the testicle at the bottom of the sac, and the endeavours which nature makes to close the upper part of the tunica vaginalis, or to what other cause, I will not pretend to say, but the fact I have several times noticed, both in the dead and in the living. I have seen such stricture made by the sac of one of these herniæ, as produced all those bad symptoms which render the operation necessary; and I have met with two different strictures, at near an inch distance from each other, in the body of a dead boy, about fourteen, one of which begirt the intestine so tight, that I could not disengage it without dividing the sac.

"In this kind of hernia I have also more frequently found connexions and adhesions of the parts to each other, than in the common one; but there is one kind of connexion sometimes met with in the congenital hernia, which can never be found in that which is a common hernial sac, and which may require all the dexterity of an operator to set free; I mean that of the intestine with the testicle, from which I have more than once experienced a good deal of trouble.

"When a common hernial sac has been laid open, and the intestine and omentum have been replaced, there can be nothing left in it which can require particular regard from the surgeon; but by the division of the sac of a congenital hernia, the testicle is laid bare, and after the parts composing the hernia have been reduced, will require great regard and tenderness, in all the future dressings, as it is a part very irritable, and very susceptible of pain, inflammation, &c.

"If a large quantity of fluid should be collected in the sac of a congenital hernia, and, by adhesions and connexions of the parts within, the entrance into it from the abdomen should be totally closed, (a case which I have twice seen) the tightness of the tumour, the difficulty of distinguishing the testicle, and the fluctuation of the fluid, may occasion it to be mistaken for a common hydrocele; and if without attending to other circumstances, but trusting merely to the feel and look of the scrotum, a puncture be hastily made, it may create a great deal of trouble, and possibly do fatal mischief.

"By what has fallen within my observation, I am inclined to believe that the sac of a congenital hernia is very seldom, if ever, distended to the degree which a common hernial sac often is: it also, from being less dilated, and rather more confined by the upper part of the spermatic process, generally preserves a pyriform kind of figure, and, for the same reason, is also generally thinner, and will therefore require more attention and dexterity in an operator when he is to open it. To which I believe I may add, that common ruptures, or those in a common sac, are generally gradually formed, that is, they are first inguinal, and by degrees become scrotal; but the congenital are seldom, if ever, remembered by the patient to have been in the groin only." (*Pott on Ruptures, Vol.* 2.)

The reader must not conclude, however, from the above account, that every rupture in children is a congenital one. Mr. Lawrence has related a case of strangulated bubonocele, which took place in an infant only fourteen months old. (*P.* 31.)

The common inguinal hernia, which first protrudes at the inner opening of the inguinal canal, and which has the epigastric artery on the inner side of its neck,

has been named by Hesselbach *external*, while the less common instance, in which the viscera pierce directly through the aponeuroses of the transverse and internal oblique muscles, and pass directly out of the abdominal ring, leaving the epigastric artery on the outer side of the neck of the sac, is distinguished by the epithet *internal*. (*Anatomisch. Chirurg. Abhandlung. uber den Ursprung der Leistenbruch.*) "The inguinal congenital hernia (says Scarpa) cannot be divided into *external* and *internal*: it is evident, that it must always be external, since the neck of the tunica vaginalis invariably corresponds to the point at which the spermatic cord passes under the margin of the transverse muscle. As for other circumstances, the tunica vaginalis lies in its whole course in the same manner as the sac of a common inguinal hernia: like this, it passes completely through the inguinal canal from one end to the other, resting upon the anterior surface of the spermatic cord. Consequently, it passes between the separation of the inferior fibres of the obliquus internus, and the principal origin of the cremaster muscle. (See *Wrisberg. sylog. comment. anat.* p. 23.) After coming out of the ring, being always united to the spermatic cord, it is enclosed in the muscular and aponeurotic sheath of the cremaster muscle, which accompanies it to the bottom of the scrotum. Since the tunica vaginalis, including the displaced viscera, enters the inguinal canal on the outside of the point, at which the spermatic cord crosses the epigastric artery, it is manifest, that, as it follows exactly the direction of this cord, it must also cross the artery, and remove it from the outer to the inner side of the ring, according to the mechanism already explained in speaking of the common inguinal hernia. Hence, the displacement of the epigastric artery constantly happens in the inguinal congenital, just as it does in the ordinary external inguinal hernia.

"But, if these two species of inguinal herniæ have some analogy to each other, in regard to the parts which constitute them, yet, they present some remarkable differences. 1. The common inguinal hernia, whether internal, or external, when it extends into the scrotum, cannot descend beyond the point at which the spermatic vessels enter the testicle. There the cellular substance of the spermatic cord terminates. There the hernial sac must unavoidably terminate. On the contrary, in the congenital hernia, the viscera may descend lower, than the testicle, with which they are in immediate contact; and, at length, they even occupy the situation of this organ, which is then pushed upward and backward. 2. In the case of a congenital hernia, the descent of the viscera from the groin to the scrotum commonly takes place in a very short time, and in some measure precipitately: it is much slower and more gradual in the ordinary inguinal hernia. The reason of this difference is very plain. In the first case, the descent of the testicle, and the formation of the tunica vaginalis, have opened and prepared the route, which the viscera must follow in forming a protrusion; while, in the second, the hernial sac cannot descend into the scrotum, but by gradually elongating the layers of the cellular substance, which joins it to the surrounding parts. This fact is so generally known, that experienced practitioners consider the promptitude, with which the viscera have descended from the groin to the bottom of the scrotum, as a characteristic sign, of a scrotal congenital hernia." (*Scarpa, Traité des Hernies*, p. 73, &c.)

If circumstances will admit of a truss being applied and worn, in cases of congenital hernia, in young subjects, there will be a considerable chance of a radical cure being effected, in consequence of the natural propensity of the opening between the abdomen and tunica vaginalis to become closed.

The only material difference in the operation, from that for a bubonocele, is, that the surgeon has to lay open the tunica vaginalis, instead of a common hernial sac. The stricture is to be divided on the same principle as that of an inguinal hernia, and much in the same manner. The parts having been reduced, the edges of the wound are to be immediately brought together, and retained so by means of one or two sutures, and sticking plaster, which is much preferable to the plan of applying the dressing to the testicle and inside of the tunica vaginalis, so as to heal the part by the granulating process.

A new species of hernia congenita has lately been described, in which a common peritoneal hernial sac, containing the viscera, is included in the tunica vaginalis. It arises from the parts being protruded, after the communication, between the abdomen and tunica vaginalis, is closed, so that the peritonæum is carried down along with the intestine, and forms a hernial sac, within the tunica vaginalis. It is evident also, that such a hernia can only be produced, while the original tunica vaginalis remains, in the form of a bag, as high as the abdominal ring. Operators should be aware of the possibility of having a sac to divide, after laying open the tunica vaginalis. (See the accounts of this hernia in *Hey's Prac-*

tical Observations, p. 221, &c. and A. Cooper's Work on Inguinal Hernia, p. 59.)

UMBILICAL HERNIA, OR EXOMPHALOS.

"The exomphalos, or umbilical rupture, (says Pott) is so called from its situation, and has (like other herniæ) for its general contents, a portion of intestine, or omentum, or both. In old umbilical ruptures, the quantity of omentum is sometimes very great.

"Mr. Ranby says, that he found two ells and half of intestine in one of these, with about a third part of the stomach, all adhering together.

"Mr. Gay and Mr. Nourse found the liver in the sac of an umbilical hernia; and Bohnius says that he did also.

"But whatever are the contents, they are originally contained in the sac, formed by the protrusion of the peritoneum.

"In recent and small ruptures, this sac is very visible; but in old, and large ones, it is broken through at the knot of the navel, by the pressure and weight of the contents, and is not always to be distinguished; which is the reason why it has by some been doubted whether this kind of rupture has a hernial sac or not.

"Infants are very subject to this disease, in a small degree, from the separation of the funiculus; but in general they either get rid of it as they gather strength, or are easily cured by wearing a proper bandage. It is of still more consequence to get this disorder cured in females, even than in males, that its return, when they are become adult, and pregnant, may be prevented as much as possible; for at this time it often happens, from the too great distention of the belly, or from unguarded motion when the parts are upon the stretch. During gestation, it is often very troublesome, but after delivery, if the contents have contracted no adhesion, they will often return, and may be kept in their place by a proper bandage.

"If such bandage was always put on in time, and worn constantly, the disease might in general be kept within moderate bounds, and some of the very terrible consequences which often attend it might be prevented. The woman who has the smallest degree of it, and who from her age and situation has reason to expect children after its appearance, should be particularly careful to keep it restrained.

"In some the entrance of the sac is large, and the parts easily reducible; in others they are difficult, and in some absolutely irreducible. Of the last kind many have been suspended for years in a proper bag, and have given little or no trouble. They who are afflicted with this disorder, who are advanced in life, and in whom it is large, are generally subject to colics, diarrhœas, and, if the intestinal canal be at all obstructed, to very troublesome vomitings. (Hence, patients are often supposed to labour under a stricture, when they really do not.) It therefore behoves such to take great care to keep that tube as clean and free as possible, and neither to eat, or drink any thing likely to make any disturbance in that part." (*Pott on Ruptures, Vol. 2.*)

Authors, who have published since the time of this celebrated surgeon, have not added much to the stock of information, which he has left, relative to the exomphalos. The writings of Mr. A. Cooper, Scarpa, (*Traité des Hernies, p. 327.*) and of all the most accurate moderns, confirm the fact, described by Pott, that, in the umbilical rupture, there is a hernial sac, just as in other instances of herniæ. Every one, acquainted with anatomy, knows, that behind the opening in the linea alba at the umbilicus, the peritoneum is complete, and consequently must be protruded before the viscera, in cases of exomphalos. In the only two cases, which Mr. A. Cooper has seen of a deficiency of the sac, the membrane had been partially absorbed, or lacerated, so as to allow the protrusion of its contents, and threaten, from this cause, a double stricture. Similar appearances, less closely inspected, probably gave rise to the opinion so firmly maintained by Dionis, De la Faye, Garengeot, and J. L. Petit, that in the umbilical hernia, the peritoneum was always lacerated, and there was no hernial sac. It is observed by Bichat, that the umbilicus is a kind of cicatrix, formed, in consequence of the separation of the funis, by the contraction of the parts with which it was continuous; and that it only gradually acquires the degree of firmness which it has in the adult subject. As it is for a long while weaker than the rest of the abdominal parietes, it only makes an inferior degree of resistance to the viscera; but this resistance increases with age; and, as the cicatrix now becomes stronger than the surrounding parts, it forms a more impenetrable barrier against any escape of the bowels. From these anatomical facts, the following pathological inferences, confirmed by experience, are deducible:—1. That infancy is more subject, than any other age, to the *umbilical* hernia, strictly so called, in which the parts protrude through the navel. 2. That other periods of life are more subject than infancy to false umbilical herniæ, or to those which arise in the vicinity of the umbilicus. (*Œuvres Chirurgicales de Desault, par Bichat, Tom. 2, p. 315.*)

Besides a true hernial sac, the exomphalos is also covered with a more superficial expansion, consisting of condensed

cellular substance. In operating, we should always cut, however, with great caution, for, often the integuments and hernial sac, in front of the tumour, are inseparably adherent; and sometimes, in consequence of the pressure of the viscera, in large cases, having caused an absorption of part of the sac, they are even found adherent to the integuments.

Pregnant women, and dropsical and corpulent subjects, are peculiarly liable to the exomphalos. In adults, there is almost always omentum in the sac when there is intestine. The transverse arch of the colon is observed to be particularly often contained in umbilical herniæ, though the small intestines are not unfrequently protruded. (*Lawrence*, 265.)

In the true umbilical hernia, the stricture is made by the tendinous opening in the linea alba. We shall next consider the umbilical hernia in the three particular forms in which it has been noticed by the latest writers.

CONGENITAL UMBILICAL HERNIA.

Dr. Hamilton has met with about two cases of this kind annually, for the space of seventeen years; and they strictly deserve the epithet *congenital*, as they appear at birth. The funis ends in a sort of bag, containing some of the viscera, which pass out of the abdomen through an aperture in the situation of the navel. The swelling is not covered with skin, so that the contents of the hernia can be seen through the thin distended covering of the cord. The disease is owing to a preternatural deficiency in the abdominal muscles, and the hope of cure must be regulated by the size of the malformation, and quantity of viscera protruded.

The plans of cure proposed, consist of the employment of a ligature, or of a bandage. The latter seems preferable, and was practised by Mr. Hey, as follows: having reduced the intestine, he desired an assistant to hold the funis compressed sufficiently near the abdomen, to keep the bowel from returning into the hernial sac.

"I procured (says he) some plaster spread upon leather, cut into circular pieces, and laid upon one another in a conical form. This compress I placed upon the navel, after I had brought the skin on each side of the aperture into contact, and had laid one of the lips a little over the other. I then put round the child's abdomen, a linen belt; and placed upon the navel, a thick, circular, quilted part, formed about two inches from one extremity of the belt.

"This bandage kept the intestine securely within the abdomen, and was renewed occasionally. The funis was separated about a week after birth; and at the expiration of a fortnight from that time, the aperture at the navel was so far contracted, that the crying of the child, when the bandage was removed, did not cause the least protrusion. I thought it proper, however, to continue the use of the bandage a little while longer. A small substance, like fungous flesh, projected, after the funis had dropped off, about half an inch from the bottom of that depression which the navel forms. A dossil of lint spread with cerat. è lapide calaminari, and assisted by the pressure of the bandage, brought on a complete cicatrization." (*P.* 227.)

This gentleman has related another example, in which the intestines were quite uncovered, and inflamed, the sac having burst in delivery. The parts were reduced; but the child died.

UMBILICAL HERNIA IN CHILDREN.

The umbilical hernia, which is sometimes formed in the fœtus, from causes difficult of explanation, takes place, in other instances, at the moment of delivery; and then, as Sabatier remarks, should it, by mistake, be tied with the funis, death would be the consequence. Most frequently, however, it is not till the second, third, or fourth month after birth, that the disease occurs; and the numerous cases collected by Desault, prove that, of ten infants attacked with this hernia, nine become afflicted at the periods just mentioned.

The umbilicus, still open, now begins to contract, so as to close the cicatrix, which, as has been already stated, forms, in the adult state, an obstacle soon capable of preventing a protrusion of the viscera, when nothing resists its formation. But, the repeated crying of the child, propelling the viscera outward, pushes them through the opening. Thus the cicatrix is forced before them, and they distend it so powerfully forward, that its closure is prevented. As their continued action gradually dilates it more and more, the intestines insinuate themselves through it, increase its natural width, project beyond it, and thus a tumour arises, which, from being of trivial size at first, becomes afterwards more considerable; at length, attains the size of an egg, or large walnut, and presents itself with all the characteristic marks of a hernia.

The presence of a piece of intestine and omentum in the tumour, keeps the umbilicus open, and opposes the continual tendency which it has to close. Such tendency, however, being sometimes superior to the resistance of the protruded

parts, forces them to return back into the abdomen, obliterates the opening through which they passed, and thus the spontaneous cure of the umbilical hernia in children is accomplished. Two cases illustrative of this fact, are related in *Œuvres Chirurgicales de Desault, par Bichat, Tom.* 2, *p.* 318.

Nature, however, does not effect many such cures, and when the case is left to her alone, she not only fails in bringing about a radical cure, but gradually renders it impossible. In short, the propensity of the opening to close diminishes, and is lost, as the subject grows older. In the adult, it is not the lodgment of the intestines in the opening, that prevents its obliteration; it is its having no disposition to undergo this beneficial change.

Hence, the umbilical hernia of children seems to be essentially distinguished from that of adults, by the tendency of the aperture to contract. Hence the ease of effecting a radical cure in children, and the almost utter impossibility of doing so in adults. In the former, it is enough to keep the intestines from protruding into the opening, and it becomes of itself obliterated; in the latter, it always continues, whether the bowels continue in it or not. Hence, the inaccuracy of the inferences deduced by some writers, from the umbilical hernia of infants, as being applicable to that of adults, and the necessity of not delaying the assistance of art in the former cases.

The means of curing the umbilical hernia of children, are of three kinds: external applications; compression; and the ligature. The first are totally useless; and, as they occasion a waste of time, are improper. Compression, and the ligature, are the only rational plans; and to these we shall limit our observations. The former is the most modern, the latter the most ancient, as it was practised by the Greeks, and then by Celsus. Desault has drawn a most able parallel between the two modes; he tells us, that the design both of the ligature and compression is the same, viz. to prevent the lodgment of the protruded viscera in the opening of the umbilicus, and thus facilitate the approximation of its sides. To accomplish this end, the ligature retrenches the hernial sac, and skin pushed before it; and, by the union of the cut parts, occasions a cicatrix, which hinders the protrusion of the viscera. At the same time, the sides of the opening, obeying their natural tendency, and affected by the irritation which they have sustained, contract, obliterate the opening, and put the cicatrix in its proper place, though now it is only an accessory means of hindering a protrusion. Compression stops up the aperture by something applied externally; thus, the deficiency, or opening, in the parietes of the abdomen, hinders the protrusion of the bowels, and keep these parts from resisting the contraction of the sac. Hence it is clear, that the two methods are founded on a different basis. Reason and experience also shew, that their results are equally different.

Though compression occasions no pain, it causes the child an irksome inconvenience, during the great length of time its employment is necessary. The ligature produces momentary pain; but there is nothing irksome attending its use, and it effects in a few days, what compression, when successful, accomplishes in several months. In one plan, continual attentions are requisite: should its employment be only for a short time neglected, the previous effect becomes almost destroyed. The other method always accomplishes its object with certainty, independently of the crying of the child, and the care of its attendants. The first, by continually compressing the sides of the opening, counteracts, in this point of view, its natural disposition to contract. The second, by artificially irritating this natural process of the umbilicus, accelerates its contraction. When compression is adopted, it is executed either by means of a flat compress applied to the opening, and which does not enter it, or else by means of some round or oval body, such as a ball of wax, a nutmeg, &c. adapted to the shape of the aperture, and, as Platner, and Richter, (in his Treatise on Hernia) advise, made continually to enter the opening. But, in the first case, if the bandage be exactly applied, the skin and sac, forming a fold in the aperture of the navel, will hinder its closure, and operate in the same manner, from without, inward, as the protruded intestines did from within outward. In the second case, the foreign body, being depressed into and maintained in the opening, will occasion, notwithstanding what Richter says, the same inconveniences, and, in a more striking manner, similar consequences. But, on the contrary, when the ligature is employed, the sac and skin of the tumour are removed, while the opening remains free, and nothing prevents its obliteration. In this method, the omentum can never protrude outward; but, in the other, if the compression should ever be inexact, the parts slip out again, above or below, and the disorder prevails on one side of the useless application. Supposing compression successful, both plans effect a closure of the umbilicus; but, while compression only accomplishes the latter object, the ligature has the additional advantage of producing an adhesion of the sides of the

opening, either to each other, or the adjacent parts. This adhesive process arises from the inflammation excited, and occasions a degree of firmness, not producible by any other mode of cure.

To this parallel, dictated by reason, (continues Desault) let us add that, which is the fruit of experience. On one side, we shall discover, that the beneficial effects of compression are only reckoned in the midst of its want of success, and that the children, on whom it is employed, miserably endure for years its irksomeness and inconveniences. If we look the other way, we shall find, that the ligature, which is employed at the Hôtel-Dieu, presents an uninterrupted series of well authenticated cures, which, in Desault's practice, amounted to the number of fifty. In the latter years of his practice, you might see many persons bringing to his public consultations their children, which were immediately operated on without any preparation, carried home immediately afterwards, and brought the next, and every following day, to be dressed, till the cure was complete.

To these considerations, are to be added other motives, which are, perhaps, not immaterial. The children of the poor may be cured in an hospital, by the ligature, in the space of a few days. But, when compression is adopted, the parents are frequently put to repeated expence, as the bandage wears out; and to additional loss from the time consumed in paying the necessary attentions.

The ancients had different modes of applying the ligature; but, what they have transmitted to us, may be referred to two different processes. One consisted in reducing the parts, and afterwards tying the integuments and sac, without opening the latter at all. In the other, an incision was made in the sac, either before, or after tying it, for the purpose of being sure, that no piece of intestine was, and could become, strangulated in the ligature. Celsus adopted the first plan. Paulus Ægineta preferred the second, and was imitated by all the Arabian physicians, and their successors. Avicenna, Albucasis, and Guy de Chauliac give us proofs of this in their several works.

Experience soon decides, which of these modes of operating ought to be chosen. One is less painful, and equally safe; for, we soon become habituated to ascertaining, whether there is still any intestine in the sac, by rubbing the opposite sides of this bag against each other. The other, which is unnecessarily cruel, increases the pain, without making the method at all more certainly successful. The latter has been usually adopted, and Paré, who has described it, does not even mention the former. Latterly, some variations in the plan of operating were made. Some simply tied the base of the tumour; others passed through it one, or two needles, armed with ligatures for the purpose of fixing such ligatures in a better manner, and even making, for this purpose, a circular incision for the lodgment of them. It is chiefly in the Arabian practice, that we meet with this cruel proceeding, which was also useless, as the ligature was never known to fail, when properly applied. Paré also describes it; but, Saviard, the only modern, who has practised the ligature, rejected it, and followed the plan long ago advised by Celsus. Sabatier seems to recommend, in his work on the operations, both plans indifferently, with the exception of the circular incision. Desault's method, which much resembles that of Saviard, is simple, and attended with little pain: in short, it is the following:

The child, on whom the operation is to be done, must be placed on its back, with its thighs a little bent, and its head inclined towards the chest. The surgeon is to reduce the protruded parts, forming the tumour, and to hold them so with his finger, at the same time, that he raises the hernial sac, and rubs its sides between his fingers, so as to be sure, that there is nothing contained in it. Being certain, that the parts, which he lifts up, are only the skin and sac, he is to direct an assistant to surround their base several times with a waxed ligature, of middling size, each turn being tied with a double knot, in such a manner as only to occasion little pain. The tumour, thus tied, is to be covered with lint, which is to be supported with one or two compresses, and a circular bandage, secured with a scapulary. A slight swelling commonly takes place in the constricted parts, by the following day, just as a polypus swells, after its base has been tied.

No pain accompanies this tumefaction, which is itself often scarcely perceptible, as may be seen by referring to the first case of this operation related in the Parisian Journal. On the second, or third day, the parts shrink, and then the ligature becomes loose, so that a fresh one must now be applied in the same manner as the first, taking care to draw it a little more tightly. The sensibility of the parts, increased by the inflammation, which the constriction of the ligature has already produced, usually renders this second ligature more painful. After the operation, the same dressings, as before, are to be applied. The tumour soon becomes discoloured, livid, and smaller. A third ligature, put on in the same way as the preceding ones, entirely obstructs the circulation in it. The part turns black and

flaccid, and commonly falls off on the eighth or tenth day. A small ulcer is left, which, being properly dressed very soon heals, and leaves a cicatrix sufficiently strong to resist the impulse occasioned by coughing, or other efforts of the abdominal muscles. For two, or three months, however, after the operation, the child should wear a circular bandage, in order to prevent, with still more certainty, the viscera from being propelled against the cicatrix, so as to interrupt the process of nature, which is now producing a gradual closure of the umbilical opening. Numerous cases might here be adduced, in confirmation of the above practice; but, several (nine) are already published in the Parisian Chirurgical Journal. The relation of others here would only prolong our observations in a fruitless manner. Suffice it to remark, that since those alluded to were published, Desault has practised an infinite number of operations of this sort with equal success; that, every week, many children were brought by their mothers into the amphitheatre, where he publicly delivered his lectures; that here the ligature was applied in the presence of all his pupils; and that children, thus operated upon, were carried home, and brought back every day to be dressed, till the cure was completed.

But, one may doubt, (says Sabatier) quoting the article in the journal, where Desault treats of the present disease, whether the infants got rid of the hernia, as it might have returned some time afterwards. Numerous facts remove this doubt; for, several of the subjects were brought to Desault's public consultation, for their diseases, a long while after they had been operated upon, and the great number of students, who examined them, all acknowledged, that the ring was completely obliterated, and there was no impulse of the viscera in coughing, sneezing, &c. Other children, in the knowledge of the surgeons of the Hôtel-Dieu, have remained perfectly cured of their umbilical herniæ, by the operation, which Desault has revived. Bichat is acquainted with two young subjects, who were operated on four years ago, and have since had no relapse.

The operation is almost certainly successful in young infants; but, it becomes less so, in proportion as their age increases. Bichat relates three cases, which tend to show, that success may be completely obtained at the age of a year and a half; that the cure is difficult, when the child is four years old; and impossible, when it is nine. Several other operations, done too late, have had the same result. (See *Œuvres Chirurgicales de Desault, par Bichat, Tom.* 2, *p.* 315, *&c.*)

Mr. Pott notices the plan of curing the exomphalos with the ligature, and expresses himself strongly against the practice in general. To adults the plan is not applicable, particularly, when the tumour is large. Mr. Pott was decidedly in favour of compression, and he observes, that, in young subjects, and small herniæ, a bandage, worn a proper time, generally proves a perfect cure. (*Vol.* 2.)

Anxious that this work should be strictly impartial, I next proceed to relate what has been recently urged against the employment of the ligature for the cure of the umbilical hernia in children, and to notice the observations, which have been adduced in favour of the treatment by compression.

The incessant care that a bandage requires, either to keep it clean, or make it always keep up the proper degree of pressure, renders its employment difficult in the children of the poorer classes. Scarpa expresses his opinion, that "this was what induced Desault to revive the operation for the umbilical hernia by the ligature, nearly such as is described by Celsus, an operation (continues Scarpa), which, a long while since, and for good reasons, was altogether abandoned. Celsus has sufficiently described the particulars of it: (*Lib.* 7, *Cap.* 14.) he states, that the tumour is sometimes to be simply tied, and that, in other instances, its base is to have a needle and double ligature introduced through it, in order that it may be embraced almost in the same way as a staphyloma is tied. But, amongst the causes, which contra-indicate this operation, he mentions so many circumstances, in relation to age, constitution, diseases of the skin, &c. that he seems to consider the cases, in which it may be practised with success, as very few. The same reflections have been made by several other ancient surgical writers, especially, by Fabricius ab Aquapendente. Desault himself has put some restrictions to the employment of the ligature, since he observes, with his usual candour, that this method does not radically cure the umbilical hernia of children, arrived at the age of four years; that it is indispensable, as Celsus inculcates, to employ a needle and double ligature, when the base of the tumour is very large; and, lastly, that, even in the youngest children, a radical cure cannot be effected by the ligature, unless a methodical compression of the navel, by means of a bandage, be kept up immediately after the operation, and for two or three months. It is perhaps to the omission of this last means, that a relapse is to be ascribed in several of the children operated upon by Desault. "*Desault avoit remis en vigueur la ligature*

tombée en désuétude. Il s'abusoit sur sa valeur ; et il n'est pas difficile d'en connoître la cause. Tous les enfans qu'il opéroit à l'Hôtel-Dieu sortoient guéris et n'y revenoient plus : on regardoit alors comme radicale une guérison momentanée." (*Nosographie Chirurgicale, Tom.* 2, *p.* 453, *par Richerand.*) I have carefully watched (says Scarpa) the immediate effects, and the more or less remote consequences of tying the umbilical hernia, either simply, or by means of a needle and double ligature ; and, after a considerable number of such cases, I believe I can assert, that *this operation, howsoever performed, is not always exempt from grave and sometimes dangerous accidents. I can also add, that it never procures a truly radical cure, unless the cicatrix, occasioned by it in the umbilical region, be submitted for some months to a methodical and uninterrupted compression. It is not so uncommon, as some surgeons pretend, to see arise after the application of the ligature, a fever attended with symptoms of most violent irritation, and acute sufferings, which cause incessant crying, and sometimes convulsions. The ulcer, which is produced by the detachment of the swelling, is always very large and difficult to heal. Every now and then it becomes painful, and emits fungous granulations, even though dressed with dry applications.*

" Latterly, it has been explained by a celebrated surgeon, (*Paletta Memor. dell' Instituto, Tom.* 2, *Part* 1.) that the umbilical vein and the suspensory ligament of the liver, being included in the ligature of the umbilical hernia, the inflammation, which originates in these parts may, perhaps, in certain cases, be communicated to the liver, so as to put the child's life in great danger. When, in consequence of the ligature, symptoms of violent irritation come on, they are ordinarily attributed to certain individual circumstances, such as extreme sensibility, or a particular disposition to spasm. Hence, it is believed, that they should be considered as exceptions, which do not exclude the general rule, and prove nothing against the utility of the operation. But, how (says Scarpa) can the surgeon ascertain the existence, or non-existence of these individual dispositions, in the children, upon which he is to operate ? Assuredly, those subjects, in which I have had occasion to notice the above accidents, enjoyed, before the operation, perfect health in every respect.

" Whatever process be adopted for tying the umbilical hernia, it is evident, that the tumour can only be constricted as far as a little way on this side of the aponeurotic ring of the umbilicus, whence, it follows, that the integuments must always remain prominent and relaxed for a certain extent, at the front and circumference of this opening. Also, after the separation of the strangulated portion, there necessarily remains, under the cicatrix, a portion of the hernial sac, and of the loose integuments, which covered it ; and as the cicatrix itself never acquires sufficient firmness to resist the impulse of the viscera, which tend to insinuate themselves into the remains of the hernial sac, the hernia sooner or later reappears, and, in a short time, becomes larger, than it was before the operation. If the subject is a little girl, it may be apprehended, that the first pregnancy will cause a recurrence of the hernia ; for, it is known, that, during gestation, the external cicatrix of the umbilicus, is considerably distended, and much disposed to give way."

Pott has seen terrible accidents caused by the rupture of the cicatrix at the navel, during pregnancy. (*Chirurg. Works, Vol.* 2, *p.* 169.) It is true, that according to this writer, this cicatrix was not the consequence of a hernia, but rather of an abscess in the umbilical region, which abscess had formerly been opened with a bistoury ; yet, observes Scarpa, it would not be impossible to raise doubts upon this conjecture. Lastly, after the separation of the tumour, there always remains, between the aponeurotic ring of the navel, and the integuments, a small cavity, formed by the neck of the hernial sac ; a cavity, into which the viscera begin to insinuate themselves after the operation, so as to hinder the complete contraction of the umbilical ring. The demonstration of what I have advanced is, in some measure to be found, in the old method of operating for the inguinal hernia, not in a strangulated state, by the ligature of the hernial sac and spermatic cord. It is well known, that most of the herniæ, operated upon by this barbarous process, were subject to relapses, because, in all probability, the cicatrix was not sufficiently firm to resist the impulse of the viscera, which entered the remains of the hernial sac. In the same manner, after the common operation for the strangulated inguinal hernia, although the cicatrix is formed very near the ring, there is no prudent surgeon, who does not advise the patient to wear a bandage the rest of his life, observation having proved, that the hernia is still liable to recur.

" An experience of several ages (observes Professor Scarpa) has put out of all doubt, that compression alone is an extremely efficacious method of radically curing the umbilical hernia of young subjects. It is attended with no risk, and, provided it be executed with the requisite caution, it is hardly ever necessary to continue it longer, than two, or three months, for the purpose of obtaining a complete cure. On the other side, if it be clearly proved, by all that I have been

observing, that the ligature never accomplishes a perfect cure without compression, it is manifest, that it cannot be at all advantageous for the children of the poor, since a bandage cannot be dispensed with. It may be said, that, in general, it does not shorten the treatment; for, in the most successful cases, the ulcer, caused by it, is not healed in less than a month, and, in order to make the cure certain, an exact compression must afterwards be kept up, by means of a bandage, two months longer. It has already been stated, that three months are ordinarily sufficient for obtaining a radical cure by the mere employment of a compressive bandage." (*Scarpa, Traité des Hernies, p.* 344—349.)

It appears from a note, which M. Cayol has inserted in the French translation of Scarpa's work on hernia, that M. Girard has published in the Journal Général de Médecine, Tom. 41, Cahier de Juillet, 1811, a memoir on the umbilical hernia of children, which was read to the Medical Society of Lyons in May, 1811, and the object of which was to recommend compression as an effectual means of cure. The arguments used were very similar to those adduced by Scarpa. In the course of the discussion, M. Cartier affirmed, that he had seen many children operated upon by Desault, who were not cured of their hernia.

The subject was afterwards taken up by the Medical Society of Paris, and the result of the debate was, that the employment of the ligature ought to be rejected. 1. Because the cure of umbilical herniæ is very often accomplished by the power of nature alone. 2. Because compression, either alone, or aided by tonic remedies, always succeeds. 3. Because the operation of the ligature deserves the triple reproach of being painful, and not free from danger, if unfortunately a piece of intestine should chance to be included in the ligature; of not succeeding in general, unless with the assistance of compression; and of being sometimes uselessly practised, as Desault himself gives us instances of.

It is farther stated by M. Cayol, that the majority of judicious surgeons have long since acknowledged the insufficiency of the ligature for the radical cure of the umbilical hernia; Sabatier, Lassus, Richerand, &c.

UMBILICAL HERNIA IN ADULT SUBJECTS.

This case is to be treated on the principles common to all ruptures. When reducible, the parts should be kept up with a bandage, or truss; which plan, however, at this period of life, affords no hope of a radical cure. Mr. Hey has described one of the best trusses for the exomphalos, which is applicable to children, when compression is preferred, as well as to adult subjects. It was invented by Mr. Marrison, an ingenious mechanic at Leeds.

"It consists of two pieces of thin elastic steel, which surround the sides of the abdomen, and nearly meet behind. At their anterior extremity they form conjointly an oval ring, to one side of which is fastened a spring of steel of the form represented. At the end of this spring is placed the pad or bolster that presses upon the hernia. By the elasticity of this spring the hernia is repressed in every position of the body, and is thereby retained constantly within the abdomen. A piece of callico or jean is fastened to each side of the oval ring, having a continued loop at its edge, through which a piece of tape is put, that may be tied behind the body. This contrivance helps to preserve the instrument steady in its proper situation." (*Practical Obs. in Surgery, p.* 231.)

When the exomphalos is irreducible, and large, the tumour must be supported with bandages.

It is observed by Professor Scarpa, that the umbilical hernia, and those of the linea alba, are less subject to be strangulated, than the inguinal and femoral herniæ; but that, when they are unfortunately affected with strangulation, the symptoms are more intense, and gangrene comes on more rapidly, than in every other species of rupture. If the operation be performed, the event is frequently unfavourable, because it is generally done too late. This practical fact is proved by the experience of the most celebrated surgeons of every age. "*Il est certain* (says Dionis) *que de cette opération il en périt plus qu'il n'en réchappe.*" (*Cours d'Opérations, p.* 98, *Edit.* 1777, *avec les notes de La Faye.*) He also adds, that they, who have the misfortune to be afflicted with an exomphalos, should rather dispense with their shirt, than a bandage. Heister says nearly the same thing. (*Instit. Chirurg. Tom.* 2, *Cap.* 94.)

It is further remarked by Scarpa, that when the omentum alone is strangulated in the exomphalos, or herniæ of the linea alba, observation proves, that the symptoms are not less intense, than when the intestine is also incarcerated. There is this difference, however, that when the omentum alone is strangulated, only nausea occurs, and, if vomiting should likewise take place, it is less frequent and violent than when the bowel itself is strangulated. In the first case, the stools are hardly ever entirely suppressed. The proximity of the stomach is, no doubt, the reason, why the strangulation of the

omentum, in the umbilical hernia, occasions far more intense symptoms of sympathetic irritation, than the strangulation of the same viscus in the inguinal, or crural hernia.

Here, says Scarpa, the operation is not only always necessary, but urgently required. It is not materially different from that, which is practised for the strangulated inguinal and crural herniæ; but, in general, it demands greater circumspection, on account of the connexion, or intimate adhesions, which frequently exist, between the integuments and hernial sac, and also the adhesions, which often prevail between the latter part and the omentum which it contains. The situation of the intestine, which is frequently covered by, and enveloped in the omentum, is another circumstance deserving earnest attention. (*Scarpa, Traité des Hernies, p.* 361, 362.)

Mr. Pott is not such an advocate as Scarpa for the early performance of the operation in cases of exomphalos:—"The umbilical, like the inguinal hernia, becomes the subject of chirurgic operation, when the parts are irreducible by the hand only, and are so bound as to produce bad symptoms. But though I have in the inguinal and scrotal hernia advised the early use of the knife, I cannot press it so much in this: the success of it is very rare, and I should make it the last remedy. Indeed I am much inclined to believe, that the bad symptoms which attend these cases are most frequently owing to disorders in the intestinal canal, and not so often to a stricture made on it at the navel, as is supposed. I do not say that the latter does not sometimes happen, it certainly does; but it is often believed to be the case when it is not.

"When the operation becomes necessary, it consists in dividing the skin and hernial sac, in such manner as shall set the intestine free from stricture, and enable the surgeon to return it into the abdomen." (*Pott on Ruptures.*)

The rest of the conduct of the surgeon is to be regulated by the usual principles.

The division of the stricture is properly recommended to be made directly upward, in the course of the linea alba.

In consequence of the great fatality of the usual operation for the exomphalos, I think the plan suggested, and successfully practised by Mr. A. Cooper in two instances, should always be adopted, whenever the tumour is at all large, and free from gangrene; a plan, that has also received the high sanction of that distinguished anatomist and surgeon, Professor Scarpa. (*Traité des Hernies, p.* 362.) I might, perhaps, safely add, that when the parts admit of being reduced, without laying open the sac, this method should always be preferred. It consists in only making an incision sufficient to divide the stricture, without opening the sac at all, or, at all events no more of it, than is inevitable.

In umbilical herniæ, of not a large size, Mr. C. recommends the following plan of operating: "As the opening into the abdomen is placed towards the upper part of the tumour, I began the incision a little below it, that is, at the middle of the swelling, and extended it to its lowest part. I then made a second incision at the upper part of the first, and at right angles with it, so that the double incision was in the form of the letter T, the top of which crossed the middle of the tumour. The integuments being thus divided, the angles of the incision were turned down, which exposed a considerable portion of the hernial sac. This being then carefully opened, the finger was passed below the intestines to the orifice of the sac at the umbilicus, and the probe-pointed bistoury being introduced upon it, I directed it into the opening at the navel, and divided the linea alba downwards, to the requisite degree, instead of upwards, as in the former operation. When the omentum and intestine are returned, the portion of integument and sac, which is left, falls over the opening at the umbilicus, covers it, and unites to its edge, and thus lessens the risk of peritoneal inflammation, by more readily closing the wound." (*On Crural and Umbilical Hernia.*)

LESS FREQUENT KINDS OF HERNIA.

The *ventral hernia*, described by Celsus, is not common; it may appear at almost any point of the anterior part of the belly, but, is most frequently found between the recti muscles. The portion of intestine, &c. is always contained in a sac, made by the protrusion of the peritonæum. Mr. A. Cooper imputes its causes to the dilatation of the natural foramina for the transmission of vessels, to congenital deficiencies, lacerations, and wounds, of the abdominal muscles, or their tendons. In small ventral herniæ, a second fascia is found beneath the superficial one; but, in large ones, the latter is the only one covering the sac.

Herniæ in the course of the linea alba sometimes occur so near the umbilicus, that they are liable to be mistaken for true umbilical ruptures. They may take place either above, or below the navel. The first case, however, is more frequent, than the second, and the following is the reason of this circumstance according to the opinion of Scarpa. "The upper half of the linea alba, that which extends from

the ensiform cartilage to the umbilicus, is naturally broader and weaker, than the lower half, the recti muscles becoming nearer and nearer together, as they descend from the navel to the pubes." (*Scarpa, Traité des Hernies, p.* 333.)

The hernial sac of ruptures at the upper part of the linea alba may contain a noose of intestine, and a piece of the omentum, though, in most cases, a portion of the latter membrane alone forms the contents. In some subjects, the linea alba is so disposed to give way, that several herniæ are observed to be formed successively in the interspace between the ensiform cartilage and the umbilicus.

"With respect to the small hernia (says Scarpa) which is considered as formed by the stomach, and concerning which Hoin and Garengeot have written so much (without either of them having related, at least to my knowledge, a single example proved by dissection), it is at least unproved, that it was exclusively formed by this viscus. I do not see, why the other viscera, particularly the omentum and transverse colon, might not also contribute to it. In my judgment, it only differs from other herniæ of the linea alba, in being situated on the left side of the ensiform cartilage, a situation, that must materially influence the symptoms of the case. In fact, whatever may be the viscera, which form it, a sympathetic irritation of the stomach is occasioned, that is much more intense, than that which ordinarily accompanies umbilical herniæ, those of the lower part of the linea alba, or, in short, all other herniæ, which are more remote from the stomach." (*Op. cit. p.* 334.)

The following are said to be the circumstances, by which the umbilical hernia, and that which occurs in the linea alba near the navel, may be discriminated.

The first, whether in the infant, or the adult, has a roundish neck, or pedicle, at the circumference of which the aponeurotic edge of the umbilical ring can be felt. Whatever may be its size, its body always retains nearly a spherical shape. Neither at its apex, or its sides, is any wrinkling of the skin, or any thing like the cicatrix of the navel, distinguishable. In some points of the surface of the tumour, the skin is merely somewhat paler and thinner, than elsewhere.

On the contrary, the hernia of the linea alba has a neck, or pedicle of an oval form, like the fissure, through which it is protruded. The body of the tumour is also constantly oval. If the finger be pressed deeply round its neck, the edges of the opening in the linea alba can be felt; and, if the hernia be situated very near the umbilical ring, the cicatrix of the navel may be observed upon one side of it, which cicatrix retains its rugosity and all its natural appearance; a certain indication, that the viscera are not protruded through the umbilical ring. (*Scarpa, Traité des Hernies, p.* 336.)

The distinction, which Scarpa has established between the umbilical hernia, properly so called, and those of the linea alba, is not useless in regard to practice. Indeed, when the latter are left to themselves, they make much slower progress than the former. On account of their smallness, they frequently escape notice, particularly in fat persons, and, when situated at the side of the ensiform cartilage. They occasion, however, complaints of the stomach, habitual colics, especially after meals; and, unfortunately for the patient, he may be tormented a very long time by these indispositions, before the true cause of them is discovered.

The umbilical hernia may be known, from the earliest period of its formation, by the alteration which it produces in the cicatrix of the navel, and the rapidity of its increase.

In other respects, these two kinds of herniæ demand the same means of cure; but, those of the linea alba, *cæteris paribus*, are more difficult to cure, than ruptures at the umbilicus. This is probably owing to the natural tendency, which the umbilical ring has to close, when the hernia is kept well reduced, whilst accidental openings in the linea alba, have not the same advantage. (*Scarpa, p.* 340.)

When a common ventral hernia is reduced, it should be kept in its place by means of a bandage or truss. When strangulated, it admits, more frequently than most other cases, of being relieved by medical treatment. If attended with stricture, which cannot otherwise be relieved, that stricture must be carefully divided. Mr. A. Cooper recommends the valvular incision, and the dilatation to be made, either upward, or downward, according to the relative situation of the tumour and epigastric artery, which crosses the lower part of the linea semilunaris.

Pudendal Hernia.—This is the name, assigned by Mr. A. Cooper, to that which descends between the vagina and ramus ischii, and forms an oblong tumour in the labium, traceable within the pelvis, as far as the os uteri. Mr. C. thinks this case has sometimes been mistaken for a hernia of the foramen ovale. When reducible, a common female bandage, or the truss used for a prolapsus ani, should be worn. A pessary, unless very large, could not very well keep the parts from descending, as the protrusion happens so far from the vagina. Mr. C. is of opinion, that, when strangulated, this hernia, in consequence of the yielding nature of the parts, may generally be reduced, by pressing

them with gentle and regular force, against the inner side of the branch of the ischium. If not, the warm bath, bleeding, and tobacco glysters, are advised. Were an operation indispensable, the incision should be made in the labium, the lower part of the sac carefully opened, and, with a concealed bistoury, directed by the finger, in the vagina, the stricture should be cut directly inward, towards the vagina. The bladder should be emptied, both before the manual attempts at reduction, and the operation. (*On Crural Hernia, &c. p.* 64.)

Vaginal Hernia.--A tumour occurs within the os externum. It is elastic, but not painful. When compressed, it readily recedes, but, is reproduced by coughing, or even without this when the pressure is removed. The inconveniences produced are an inability to undergo much exercise, or exertion; for, every effort of this sort brings on a sense of bearing down. The vaginal hernia protrudes in the space, left between the uterus and rectum. This space is bounded below by the peritonæum, which membrane is forced downwards towards the perinæum; but, being unable to protrude further in that direction, is pushed towards the back part of the vagina. Mr. C. advised the use of a pessary in one case; the plan, however, was neglected. These cases, probably, are always intestinal.

Some herniæ protrude at the anterior part of the vagina. (See *Mr. A. Cooper on Crural Hernia, &c. p.* 65, 66.)

Perineal Hernia.—In men, the parts protrude between the bladder and rectum; in women, between the rectum and vagina. The hernia does not project, so as to form an external tumour, and, in men, its existence can only be distinguished by examining in the rectum. In women, it may be detected both from this part, and the vagina.

In case of strangulation, the hernia might, perhaps, be reduced by pressure from within the rectum. An interesting case of perineal hernia, which took place from the peritonæum being wounded with the gorget in lithotomy is related by Mr. Bromfield; *Chirurgical Observations, p.* 264.

The reducible perineal hernia in women may be kept from descending, by using a large pessary. Both this kind of rupture and the vaginal may prove very dangerous in cases of pregnancy. See *Smellie's Midwifery, Case* 5.

Thyroideal Hernia, or *Hernia Foraminis Ovalis.* In the anterior and upper part of the obturator ligament, there is an opening, through which the obturator artery, vein, and nerve proceed, and through which, occasionally, a piece of omentum, or intestine is protruded, covered with a part of the peritonæum, which constitutes the hernial sac.

In the case, which Mr. A. Cooper met with, the hernia descended above the obturatores muscles. The os pubis was before the neck of the sac; three-fourths of it were surrounded by the obturator ligament; and the fundus of the sac lay beneath the pectineus and adductor brevis muscles. The obturator nerve and artery were situated behind the neck of the sac, a little towards its inner side. This species of hernia can only form an outward tumour, when very large. Garengeot, however, met with an instance, in which there was not only a swelling, but, one attended with symptoms of strangulation: he reduced the hernia, which went up with a guggling noise; the symptoms were stopped, and stools soon followed.

The hernia of the foramen ovale, when reducible, must be kept up with a suitable truss; and when strangulated, and not capable of relief from the usual means, an operation would be requisite, though attended with difficulties. The division of the obturator ligament and mouth of the sac should be made inwards, to avoid the obturator artery. This vessel, however, would even be exposed to injury by following this plan, if it should arise in common with the epigastric artery. (See *a paper by Garengeot in Mém de l'Acad. de Chir. tom.* 1; *and A. Cooper on Crural Hernia, &c. p.* 70.)

Cystocele.--As Mr. Pott observes; "The urinary bladder is also liable to be thrust forth from its proper situation, either through the opening in the oblique muscle, like the inguinal hernia, or under Poupart's ligament, in the same manner as the femoral.

"This is not a very frequent species of hernia, but does happen, and has as plain and determined a character as any other.

"It has been mentioned by Bartholin, T. Dom. Sala, Platerus, Bonetus, Ruysch, Petit, Mery, Verdier, &c. In one of the histories given by the latter, the urachus, and impervious umbilical artery on the left side, were drawn through the tendon into the scrotum, with the bladder; in another he found four calculi.

"Ruysch gives an account of one complicated with a mortified bubonocele. Mr. Petit says he felt several calculi in one, which were afterwards discharged through the urethra.

"Bartholin speaks of T. Dom. Sala as the first discoverer of the disease, and quotes a case from him, in which the patient had all the symptoms of a stone in his bladder; the stone could never be felt by the *sound*, but was found in the bladder (which had passed into the groin) after death.

"As the bladder is only covered in part by the peritoneum, and must insinuate itself between that membrane and the

oblique muscle, in order to pass the opening in the tendon, it is plain that the hernia cystica can have no sac, and that, when complicated with a bubonocele, that portion of the bladder which forms the cystic hernia must lie between the intestinal hernia and the spermatic chord, that is, the intestinal hernia must be anterior to the cystic.

"A cystic hernia may indeed be the cause of an intestinal one; for when so much of the bladder has passed the ring, as to drag in the upper and hinder part of it, the peritoneum which covers that part must follow, and by that means a sac be formed for the reception of a portion of gut or caul. Hence the different situation of the two herniæ in the same subject.

"While recent, this kind of hernia is easily reducible, and may, like the others, be kept within by a proper bandage; but when it is of any date, or has arrived to any considerable size, the urine cannot be discharged, without lifting up, and compressing the scrotum; the outer surface of the bladder is now become adherent to the cellular membrane, and the patient must be contented with a suspensory bag.

"In case of complication with a bubonocele, if the operation becomes necessary, great care must be taken not to open the bladder instead of the sac, to which it will always be found to be posterior. And it may also sometimes by the inattentive be mistaken for a hydrocele, and by being treated as such, may be the occasion of great or even fatal mischief." (*Vol.* 2.)

The cystocele is always easily distinguishable by the regular diminution of the swelling, whenever the patient makes water.

Verdier and Sharp have accurately described the cystocele. Pott has offered two cases, which fell under his observation; *Vol.* 3. Pipelet le Jeune mentions a cystic hernia in perinæo, and several cases of its occurrence in the female; *Acad. de Chir. tom.* 4. Pott cut into one cystocele, by mistake. Mention is made (*Edinb. Surg. Journ. vol.* 4. *p.* 512.) of a cystic hernia, which protruded between the origins of the levator ani, and obturator internus muscles: the tumour made its appearance in the pudendum of an old woman. Gunz and Hoin have also treated of the cystocele.

Ischiatic Hernia.—The case is probably very rare. A case, however, which was strangulated, and undiscovered till after death, is related in Mr. A. Cooper's second part of his work on hernia. It is communicated by Dr. Jones, already celebrated for his book on hemorrhage. The disease happened in a young man, aged 27. On opening the abdomen, the ilium was found to have descended on the right side of the rectum into the pelvis, and a fold of it was protruded into a small sac, which passed out of the pelvis at the ischiatic notch. The intestine was adherent to the sac at two points: the strangulated part, and about three inches on each side, were very black. The intestines towards the stomach were very much distended with air, and, here and there, had a livid spot on them. A dark spot was even found on the stomach itself just above the pylorus. The colon was exceedingly contracted, as far as its sigmoid flexure. A small orifice was found in the side of the pelvis, in front of, but a little above, the sciatic nerve, and on the forepart of the pyriformis muscle. The sac lay under the glutæus maximus muscle, and its orifice was before the internal iliac artery, below the obturator artery, but above the vein. Mr. A. Cooper remarks, that a reducible case might be kept up with a spring truss, and, that if an operation were requisite, the orifice of the sac should be dilated directly forwards. (*On Crural Hernia, &c. p.* 73.)

Phrenic Hernia.—The abdominal viscera are occasionally protruded through the diaphragm, either through some of the natural apertures in this muscle, or deficiencies, or wounds, and lacerations in it. The second kind of case is the most frequent: Morgagni furnishes an instance of the first. Two cases, related by Dr. Macauley in *Med. Obs. and Inq. Vol.* 1. and two others published by Mr. A. Cooper, are instances of the second sort: and another case has been lately recorded by the latter gentleman, affording an example of the third kind. Hildanus, Paré, Petit, Schenck, &c. also mention cases of phrenic hernia. The disease is quite out of the reach of art.

Mesenteric Hernia.—If one of the layers of the mesentery be torn by a blow, while the other remains in its natural state, the intestines may insinuate themselves into the aperture, and form a kind of hernia. The same consequence may result from a natural deficiency in one of these layers. Mr. A. Cooper records a case, in which all the small intestines, except the duodenum, were thus circumstanced. The symptoms during life were unknown. (*On Crural Hernia, &c. p.* 82.)

Mesocolic Hernia.—So named by Mr. A. Cooper, when the bowels glide between the layers of the mesocolon. There is a specimen of this disease, preserved at St. Thomas's hospital.

Every surgeon should be aware, that the intestines may be strangulated within the abdomen from the following causes: 1. Apertures in the omentum, mesentery, or mesocolon, through which the intestine protrudes. 2. Adhesions, leaving an aper-

ture, in which a piece of intestine becomes confined. 3. Membranous bands at the mouths of hernial sacs, which becoming elongated, by the frequent protrusion and return of the viscera, surround the intestine, so as to strangulate them within the abdomen, when returned from the sac. (See *A. Cooper on Crural Hernia, &c. p.* 85.)

Pott remarks, that "Ruysch gives an account of an impregnated uterus being found on the outside of the abdominal opening; and so do Hildanus and Sennertus. Ruysch also gives an account of an entire spleen having passed the tendon of the oblique muscle. And I have myself seen the ovaria removed by incision, after they had been some months in the groin." (*Vol.* 2.)

The best sources of information on hernia are the following: *Franco, Traité des Hernies, &c.; Lyon,* 1561; 8vo. *Littre, Observation sur une Nouvelle Espèce de Hernie; Mem. de l'Acad. des Sciences;* 1700. *Mery; same work;* 1701. *Littre, sur une Hernie Rare; same work;* 1714. *Mauchart de Herniâ incarceratâ; Tubing.* 1722. *Heister, Instit. Chirurg. et De Herniâ Incarceratâ Suppuratâ non semper lethali. Vogel, abhand lung aller arten der bruche; Lips.* 1738. *Peyronie, Observations, &c. sur la Cure des Hernies avec Gangrene; Mém. de l'Acad. de Chir. tom.* 1. *Gunzius, Observationum Anatomico-chirurgicarum de Herniis libellus; Lips.* 1744. *Arnaud on Hernias,* 1748; *also his Mem. de Chir. Haller de Herniis Congenitis,* 1749. *Garengeot, sur plusieurs Hernies singulières; Mem. de l'Acad. de Chir. tom.* 2. *Moreau sur les suites d'une Hernie opérée; Mem. de l'Acad. de Chir. tom.* 3. *Benevoli, una Ernia assai particolare; Firenzo,* 1750. *Haller Herniarum adnotationes; extant. in opuscul. pathol.* 1755. *Blanc Nouvelle Méthode d'opérer les Hernies; avec un essai sur les Hernies, par M. Hoin; Orleans,* 1767; 8vo. *Louis, Reflexions sur l'Opération de la Hernie; Mem. de l'Acad. de Chir. tom.* 4. *Hoin, Essai sur les Hernies rares et peu connues;* 1767. *Medical Observations and Enquiries. Pott's Works, vols.* 2. *and* 3. *Goursaud sur la Différence des Causes de l'étranglement des Hernies; Mem. de l'Acad. de Chir. tom.* 4. *Le Dran, Traité des Opérations de Chir. et Observations de Chir. obs.* 57. *F. Hildanus, cent.* 5. *obs.* 54. *J. L. Petit, Traité des Mal. Chir. tom.* 2. *Sharp on the Operations, and his Critical Enquiry. Bertrandi Traité des Opérations, et Exemple d'une Hernie formée du côté droit par l'intestin ileum seulement, dont une portion s'étoit echappée par une des échancrures ischiatiques, en se glissant sur les ligaments sacro-sciatiques; Mem. de Chir. tom.* 2. *Saltzmann, Disp. de Vesicæ Urinariæ Herniâ;* 1712. *Mery sur des Descentes de la Vessie; Acad. des Sciences,* 1713. *J. L. Petit sur les Hernies de la Vessie; Acad. des Sciences,* 1717. *Verdier, Recherches sur la Hernie de la Vessie; Mem. de l'Acad. de Chir. tom.* 2. *Divoux, Disp. de Herniâ Vesicæ Urinariæ; Argent.* 1732. *Levret, Obs. sur la Hernie de la Vessie; Mem. de l'Acad. de Chir. tom.* 2. *P. Petit (le jeune) sur les Hernies de la Vessie, et de l'Estomac; Acad. de Chir. tom.* 4. *Vater de Lienis Prolapsione;* 1746. *Peyronie sur un étranglement de l'intestin, causé intérieurement par l'adhérence de l'epiploon au-dessus de l'anneau; Mem. de l'Acad. de Chir. tom.* 1. *Tenon in Acad. des Sciences;* 1764. *Gunzius, Obs. de Entero-epiplocele. Callisen, System. Chirurg. hodiernæ, pars posterior. Richter Von den Brüchen, in* 2 *vols.* 1778, 1779: *or the French transl. by Rougemont. Also Richter's Bibliothek, and Anfang. der Wundarzn. Wilmer's Pract. Obs. on Herniæ. Schmucker's Chir. Wahrnehmungen. Desault's Œuvres Chirurg. par Bichat. tom.* 2. *Hey's Pract. Observ. in Surgery. Sandifort's Anat. Pathol. Camper's Demonstrat. Anat. Pathol.* 1760; *and his Icones Herniarum, edit. à Soemmerring,* 1801. *Dr. Hunter's Med. Comment.* 1762, 1764. *Monro in Edinb. Med. Essays; and the edition of his works by his Son. Gimbernat's Account of a New Method of operating for Femoral Hernia. A. Cooper on Inguinal and Congenital Hernia; and on Crural and Umbilical Hernia. Monro on Crural Hernia,* 1803. *Sabatier, Médecine Opératoire, tom.* 1. *Chopart and Desault, Traité des Mal. Chir. Desault, Parisian Surgical Journal. Wrisberg in Comment. Reg. Societ. Gotting.* 1778. *Schmucker's Vermische Chir. Schriften. Haller's Opera Minora; and Disputationes Chir. Sull'ernie Memorie anatomico-chirurgiche di Antonio Scarpa,* 1809 *and* 1810; *or the French transl. by Gayol,* 1812. *Richerand's Nosographie Chirurgicale, Tom.* 3. *p.* 354, *&c. Edit.* 2. *Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 1, *&c., Edit.* 1809. *Pelletan Clinique Chirurgicale, Tom.* 3. *Travers on Injuries of the Intestines, &c.* 1812. *Léveillé, Nouvelle Doctrine Chirurgicale, Tom.* 3, *p.* 170, *&c.* 1812. *But, above all, the work, which I feel infinite pleasure in recommending, from a conviction of its superior merit, and practical utility, is a Treatise on Hernia by W. Lawrence; 8vo. the first edit. of which was published* 1807, *the second in* 1810, *under the title of a Treatise on Ruptures.*

HERNIA CEREBRI. (*Fungus Cerebri. Encephalocele.*) This name is given to a tumour, which every now and then rises from the brain, through an ulcerated opening in the dura mater, and protrudes through a perforation in the cranium, made by the previous application of the trephine. Mr. Abernethy has made some observations on this disease, and related some cases. In one of these, the hernia cerebri arose on the tenth day after trephining, and was as large as a pigeon's egg; the pia mater, covering it, was inflamed; and a turbid serum was discharg-

ed at the sides of the swelling, from beneath the dura mater. On the eleventh day, the tumour was as large as a hen's egg, smooth, and ready to burst. The man died the next day. On examination, the swelling was found larger, than before, and of a dark colour, with an irregularly granulated surface. This appearance was owing to coagulated blood, which adhered to its surface, as the part had bled so much, that the patient's cap was rendered quite stiff with blood. The pia mater was in general much inflamed, and, as well as the dura mater, was deficient at the place of the tumour. The deeper part of the swelling seemed to consist of fibrous coagulated blood, and it was found to originate about an inch below the surface of the brain.

Mr. Abernethy explains the particular appearances and progress of the disease, as follows: "In consequence of the brain being injured to some depth beneath the surface, disease of the vessels, and consequent effusion of the blood, had ensued; the effusion was, for a time, restrained by the superincumbent brain and its membranes; but, these gradually yielding to the expansive force exerted from within, and at last giving way altogether, the fluid blood oozed out and congealed upon the surface of the tumour." An organized fungus could hardly be produced so rapidly as these tumours are. (*Essay on Injuries of the Head, p.* 37.)

Mr. C. Bell contends, however, that such swellings are vascular and organized. (*Operative Surgery, Vol.* 1.)

When the bad symptoms disappear, on the tumour being no longer confined by the dura mater, it is best to interfere as little as possible, as the hemorrhage will probably cease, and the tumour drop off in pieces. (See *Edinb. Med. Comment. Vol.* 1. *p.* 98. *Med. Museum. Vol.* 4. *p.* 463.) The mildest dressings alone should be employed, and all pressure avoided.

When the tumour acquires a very great size, it may be pared off with a knife, as Mr. Hill did several times, with success. (*Cases in Surgery.*)

Should the swelling still increase, and bad symptoms prevail, in consequence of the irritation and pressure on the brain, the opening in the bone ought to be enlarged. Where the bleeding to continue in a dangerous degree, Mr. Abernethy suggests removing the coagulum, to try whether exposure of the cavity would stop the effusion of blood. Quesnay mentions an instance, in which a patient tore off the coagulum himself, and the cavity healed up; *Mem. de l'Acad. de Chir. tom.* 1. The danger of applying styptics, and irritating applications is shewn by Hildanus, *Obs.* 14, and Mr. Hill, *p.* 198. (See *Abernethy on Injuries of the Head.*)

One would suppose, that cases of this kind would generally require the employment of every thing at all likely to keep off, and diminish, inflammation of the brain.

HERNIA HUMORALIS. (*Inflammatio Testis. Swelled Testicle.*) A very common symptom, attending a gonorrhœa, is a swelling of the testicle, which is only sympathetic, and not venereal, because the same symptoms follow every kind of irritation on the urethra, whether produced by strictures, injections, or bougies. Such symptoms are not similar to the actions arising from the application of venereal matter, for suppuration seldom occurs, and when it does, the matter is not venereal. The swelling and inflammation appear suddenly, and as suddenly disappear, or go from one testicle to the other. The epididymis remains swelled, however, even for a considerable time afterwards. (*J. Hunter.*)

The first appearance of swelling is generally a soft pulpy fulness of the body of the testicle, which is tender to the touch; this increases to a hard swelling, accompanied with considerable pain. The epididymis, towards the lower end of the testicle, is generally the hardest part. The hardness and swelling, however, often pervade the whole of the epididymis. The spermatic chord, and especially, the vas deferens, are often thickened and sore to the touch. The spermatic veins sometimes become varicose. A pain in the loins, and sense of weakness there, and, in the pelvis, are other casual symptoms. Cholicky pains; uneasiness in the stomach and bowels; flatulence; sickness; and even vomiting; are not unfrequent. The whole testicle is swelled, and not merely the epididymis, as has been asserted. (*J. Hunter.*)

The inflammation of the part most probably arises from its sympathizing with the urethra. The swelling of the testicle coming on, either removes the pain in making water, and suspends the discharge, which do not return, till such swelling begins to subside; or else the irritation in the urethra, first ceasing, produces a swelling of the testicle, which continues till the pain and discharge return; thus rendering it doubtful, which is the cause, and which the effect. Occasionally, however, the discharge has become more violent, though the testicle has swelled; and such swelling has even been known to occur after the discharge has ceased; yet, the latter has returned with violence, and remained as long as the hernia humoralis. (*J. Hunter.*)

Irritation at the mouth of the vasa de-

ferentia has been mentioned as a cause; but, were this true, both testicles would usually be affected at the same time, and the complaint would occur more frequently, when the irritation of the urethra extends far towards the bladder, than when it only reaches about an inch and a half, or two inches, from the orifice of the passage. (*J. Hunter.*)

Hernia humoralis, with stoppage of the discharge, is apt to be attended with strangury. A very singular thing is, that the inflammation more frequently comes on when the irritation in the urethra is going off, than when it is at its height. (*J. Hunter.*)

The enlargements of the testicle, from cancer and scrophula, are generally slow in their progress; that of a hernia humoralis very quick. (*J. Hunter.*)

Rest is the best remedy, and the horizontal position of the body is easiest. At all events, the testicle must be well suspended; to which expedient the patient will readily have recourse as soon as he knows the ease it affords. The case is treated as inflammation in general, by bleeding and purging, and applying fomentations and poultices. Leeches have often proved serviceable. The swelling not being venereal, mercury is only useful in removing the induration, continuing after the inflammation has subsided. Vomits have been recommended, and found beneficial. They have even been known to cure the complaint in a surprizingly sudden manner. Opiates are useful. When suppuration occurs, no mercury is requisite, only common treatment.

As the hernia humoralis often appears to depend on the cessation of the discharge, some (*Bromfield*) have advised irritating the urethra with bougies to bring on the gonorrhœa again; but the practice is not followed by the expected good. The introduction of venereal matter into the urethra has also been most absurdly suggested.

A hernia humoralis is at first very quick in subsiding; but, some of the swelling remains a long while, and the hardness and swelling of the epididymis even continue for years, nay, for life. However, no inconvenience attends the mere induration. In such instances, the vas deferens may occasionally be rendered impervious, though the occurrence must be by no means frequent. (*J. Hunter.*)

Frictions with camphorated mercurial ointment; fumigations with aromatic herbs; and electricity; are the best means for promoting the absorption of the superfluous particles, causing the induration in question. (*J. Hunter.*)

The signs, distinguishing a hernia humoralis from a scrotal rupture, are explained in the article *Hernia*.

John Hunter has undoubtedly given the best account of hernia humoralis.

HERPES. (from ἕρπω, to creep.) Several cutaneous, superficial kinds of ulcerations, having a great propensity to creep, or spread over the skin, are so named. Cullen places this disease in the class *locales*, and order *dialyses*; and defines it, phlyctenæ, or a great number of small ulcers, crowding together, creeping, and difficult to heal. For an account of one disease, usually considered as a species of herpes, see *Noli me tangere*. Refer also to *Tinea Capitis*, which some have classed with herpes.

The *tetter*, *ring-worm*, *serpigo*, or *darta*, consists of clusters of sharp-pointed pustules, of a yellowish white colour, with inflamed bases. The disease is attended with more or less smarting and itching, is sometimes difficult of cure, and apt to recur. When the disorder is connected with constitutional causes, small doses of mercury are useful. One of the best local applications, is a solution of the hydrargyrus muriatus in lime-water.

Shingles, *zona aurea*, or *herpes zoster*, is a disease, which appears in large clusters on the neck, breast, loins, hips, or thighs, and sometimes spreads all round the body, or limbs. The heads of the little pustules have at first a white watery appearance, and then a small round scab, resembling a millet-seed. Hence the name *herpes miliaris*. The complaint is often attended with febrile symptoms. The treatment should resemble that of erysipelas; but, bark and camphor are particularly recommended as useful internal medicines. The lotion of lime-water, and muriated mercury is also said to be frequently an efficacious application. Old persons are subject to a more inveterate, obstinate, and dangerous species of shingles. All the other kinds of herpes, enumerated by writers, are medical cases, as, indeed, some may consider the two latter affections: we shall, therefore, not enlarge on the subject in this work.

HORDEOLUM, (dim. of *hordeum*, barley.) A little tumour on the eye-lid, resembling a barley-corn. *A Stye*. As Scarpa remarks, the stye is strictly only a little boil, which projects from the edge of the eye-lids, particularly often near the great angle of the eye. This little tumour, like the furunculus, is of a dark red colour, much inflamed, and a great deal more painful, than might be expected, considering its small size. The latter circumstance is partly owing to the vehemence of the inflammation producing the

stye, and partly to the exquisite sensibility and tension of the skin, which covers the edge of the eyelids. On this account, the hordeolum very often excites fever and restlessness in delicate, irritable constitutions; it suppurates slowly and imperfectly; and, when suppurated, has no tendency to burst.

The stye, like other furunculous inflammations, forms an exception to the general rule, that the best mode, in which inflammatory swellings can end, is resolution. For, whenever, a furunculous inflammation extends so deeply as to destroy any of the cellular substance, the little tumour can never be resolved, or only imperfectly so. This event, indeed, would rather be hurtful, since there would still remain behind a greater or smaller portion of dead cellular membrane; which, sooner or later, might bring on a renewal of the stye in the same place as before, or else become converted into a hard indolent body, deforming the edge of the eyelid.

The resolution of the incipient hordeolum may be effected in that stage of it, in which the inflammation only interests the skin, and not the cellular substance underneath, as is the case on the first appearance of the disease. Now repellent, cold applications are useful; particularly ice. But when the hordeolum has affected, and destroyed, any of the cellular membrane underneath, every topical repellent application is absolutely useless, and even hurtful; and the patient should have recourse to emollient anodyne remedies. The hordeolum and eyelids should be covered with a warm soft bread and milk poultice, which ought to be renewed very often. When a white point makes it appearance on the apex of the little tumour, Scarpa says, the surgeon should not be in a hurry to let out the small quantity of serous matter, which exists between the skin and dead portion of cellular membrane. It is better, that he should wait till the skin, within this white point, has become still somewhat thinner, so as to burst of itself, and give a ready vent, not merely to the little serous matter, but, to all the dead cellular membrane, which constitutes the chief part of the disease. When the contents of the little tumour are slow in making their way outward, through the opening, the surgeon, gently compressing the base of the stye, ought to force them out. After this, all the symptoms of the disease will disappear, and the cavity, left by the dead cellular membrane, in the centre of the little tumour, will be found quite filled up, and healed, in the course of twenty-four hours.

Sometimes, though seldom, this process of nature, destined to detach the dead from the living cellular membrane, only takes place incompletely, and a small fragment of yellow dead cellular substance still continues fixed in the cavity, and hinders the cure. In this circumstance, the further employment of emollient poultices is of little or no service. The surgeon should dip the point of a camel-hair pencil in sulphuric acid, and touch the inside of the stye with it, one or more times, until the sloughy cellular membrane comes away. After this, the small cavity remaining will soon close. Should the eyelid continue afterwards a little swollen and œdematous, this affection may be removed by applying the lotio aquæ litharg. acet., containing a little spirit of wine. Some persons are very often annoyed with this disease. Scarpa imputes this most frequently to a disordered state of the *primæ viæ*, often met with in persons who live on acrid irritating food, and drink too much spirits. (See *Scarpa sulle Malattie degli Occhi, cap.* 2.)

HYDARTHRUS. (from ὕδωρ, water, and ἄρθρον, a joint.) The white swelling. (See *Joints.*)

HYDRARGYRIA. A peculiar eruption occasioned by the use of mercury. (See *Mercury.*)

HYDRARGYRUS. (from ὕδωρ, water, and ἄργυρος, silver.) Quicksilver; mercury. (See *Mercury.*)

HYDROCELE. (from ὕδωρ, water, and κήλη, a tumour.) The term *hydrocele*, if used in a literal sense, means any tumour produced by water; but surgeons have always confined it to those, which possess either the membranes of the scrotum, or the coats of the testicle and its vessels. The first of these, viz. that which has its seat in the membranes of the scrotum, is common to the whole bag, and to all the cellular substance, which loosely envelopes both the testes. It is, strictly speaking, only a symptom of a disease, in which the whole habit is most frequently more or less concerned, and very seldom affects this part only. The latter, or those which occupy the coats immediately investing the testicle and its vessels, are absolutely local, very seldom affect the common membrane of the scrotum, generally attack one side only; and are frequently found in persons, who are perfectly free from all other complaints.

Dr. Monro, the father, professor of anatomy at Edinburgh, and Mr. Samuel Sharp, were almost the only writers, before Mr. Pott, who sensibly and rationally explained the true nature of these diseases.

ANASARCOUS TUMOUR OF THE SCROTUM.

It is most frequently only a symptom

of a dropsical habit, and very often accompanies both the general anasarca, and the particular collection within the abdomen, called the ascites. This being the case, and the true method of cure consisting in an internal medical process, it has been improperly ranked among the species of hydrocele, though the nature of the contents will certainly admit the use of the word.

"It is (says Pott) an equal, soft tumour, possessing every part of the cellular membrane, in which both the testicles are enveloped, and consequently is generally as large on one side as on the other; it leaves the skin of its natural colour; or, to speak more properly, it does not redden or inflame it; if the quantity of water be not large, nor the distention great, the skin preserves some degree of rugosity; the tumour has a doughy kind of feel; easily receives, and for a while retains, the impression of the fingers; the raphe, or seam, of the scrotum divides the swelling nearly equally; the spermatic process is perfectly free, and of its natural size; and the testicles seem to be in the middle of the loaded membrane. This is the appearance, when the disease is in a moderate degree. But if the quantity of extravasated serum be large, or the disease farther advanced, the skin, instead of being wrinkled, is smooth, tense, and plainly shews the limpid state of the fluid underneath: it is cold to the touch, does not so long retain the impression of the finger, and is always accompanied with a similar distention of the skin of the penis; the preputium of which is sometimes so enlarged, and so twisted, and distorted, as to make a very disagreeable appearance. These are the local symptoms: to which it may be added, that a yellow countenance, a loss of appetite, a deficiency of urinary secretion, swelled legs, a hard belly, and mucous stools, are its very frequent companions.

"The cure of the original disease comes within the province of the physician, and requires a course of internal medicine: but sometimes the loaded scrotum and penis are so troublesome to the patient, and in such danger of mortification, that a reduction of their size becomes absolutely necessary; and at other times a derivation, or discharge, of the redundant extravasated serum from this part is ordered as an assistant to the internal regimen.

"The chirurgical means in use for this end is called in general scarification; a term, whose precise sense has by no means been settled; by which it has now and then happened, that a general order being given, and the particular method of executing it being left to the choice of those who have not been sufficiently acquainted with this kind of business, much hazard has been incurred, and considerable mischief done, which might have been avoided.

"The means of making this discharge are two, viz. puncture and incision: the former is made with the point of a lancet; the latter with the same instrument, or with a knife.

"The generality of writers on this subject have spoken on the two methods in such a manner, that a practitioner, who had seen but little of either, would be inclined to think, that it was a matter of great indifference, which we should make use of; and that the safety and utility of each were equal: which is by no means the case.

"The intention of the use of either is, by a discharge of extravasated serum, to alleviate the present uneasiness; and, by reducing the size of the scrotum, to render it less troublesome, and less likely to mortify. In some few instances, it has indeed happened, that this drain has proved a radical cure of the original disease; but that has been accidental, and is not in general to be expected. The intention is generally palliative; and, if the patient lives, is most likely to require repetition: therefore, if there be any difference between the two methods, with regard either to ease or safety, there can be no doubt which ought to be preferred.

"All wounds of membranous parts, in anasarcous or dropsical habits, are necessarily both painful and hazardous; they are apt to inflame, are very difficultly brought to suppuration, and will often prove gangrenous in spite of all endeavours to the contrary. But the larger and deeper the wounds are, the more probable are these bad consequences. Simple punctures, with the point of a lancet, are much less liable to be attended by them, than any other kind of wound; they generally leave the skin easy, soft, cool, uninflamed, and in a state to admit a repetition of the same operation, if necessary. Incisions create a painful, crude, hazardous sore, requiring constant care. Punctures seldom produce any uneasiness at all; and stand in need of only a superficial pledget, for dressing.

"Now, although there is so very material a difference in the symptoms and trouble attending the two methods, yet is there none in their effect: the communication of the cells of the dartos with each other is so free, through every part of it, that punctures made with the fine point of a bleeding-lancet, into the most superficial of them, will, as certainly and as freely, drain off all the water, as a large incision, without any of its inconveniences or its hazard. Neither the one

nor the other will cure the original disease, unless by mere accident: they are both made, with a design to cure only the local one. The same habit and constitution remaining, the same effect will in general follow, and the same relief be again necessary. The ease, the freedom from bad symptoms, or from danger, and the state in which the parts are left, render one method practicable at all times, and capable of being repeated as often as may be thought necessary: the fatigue, pain, confinement and hazard, which most frequently attend the other, make one experiment in general as much as most people choose to submit to, or indeed have an opportunity of complying with."

Mr. Pott afterwards remarks: "If we consider the preceding complaint as merely symptomatic, and do not rank it among the different kinds of hydrocele, there will then remain only three, viz.

"1. That which consists of a collection of water in the cells of the tunica communis, or cellular membrane, enveloping and connecting the spermatic vessels.

"2. That which is formed by the extravasation of a fluid, in the same coat as the former, but which, instead of being diffused through the general cellular structure of it, is confined to one cavity or cyst, in which all the water constituting this species of disease is contained; the rest of the membrane being in its natural state.

"3. That which is produced by the accumulation of a quantity of water, in the cavity of the tunica vaginalis testis.

"These three are distinct, local, and truly within the province of surgery. They may accidentally be combined or connected with other disorders, but not necessarily; and are frequently found in persons whose general habit is good, and who are perfectly free from all other complaints."

THE HYDROCELE OF THE CELLS OF THE TUNICA COMMUNIS.

"The spermatic vessels, from their origin quite down to the insertion into the testicle, are enveloped in, and connected together by, a membrane, called formerly tunica vaginalis vasorum spermaticorum, but now (more properly) tunica communis. This membrane, so enveloping the spermatic vessels, has no one particular cavity, (as its old name would seem to imply;) but is merely cellular, as either the inflation of air or the extravasation of a fluid, will always prove. While it is within the cavity of the belly, its cells are lax and large; and when it has passed out from thence, and has formed a part of the spermatic process, by enveloping its vessels, its cells are rather smaller, and the membrane composing them, firmer. It is included within that thin expansion of muscular fibres, called the cremaster. And a great number of lymphatics, passing from the testicle to the receptaculum chyli, are always to be found in it.

"An attentive consideration of these circumstances in the structure of this part will shew us, (continues Pott) why either obstruction or breach of the lymphatic vessels, considerable pressure by means of diseased indurations within the abdomen, or a morbid state of the parts which should receive the lymph from the vessels of the spermatic cord, may induce the disease in question; and also, when it is produced, that its appearance, and the nature of the extravasation, must make the term *cellular* a very proper one, as expressive of its true state.

"When the disease is simple, it is perfectly local; that is, it is confined entirely to the membrane forming the tunica communis; and does not at all affect, either the scrotum, the tunica vaginalis testis, or any other part."

According to Pott, it does not give a great deal of trouble, unless it arrives to a considerable size; and, being by no means so frequent as either of the other two kinds of hydrocele, it is in general but little known or attended to. With some, it passes for a varix of the spermatic cord; with others, for the descent of a portion of omentum, which, having contracted an adhesion, cannot be returned. Thus, its true nature not being in general rightly understood, and it giving but little trouble or uneasiness while it is within moderate bounds, and neither hindering any necessary action or faculty, they who have it are most frequently advised to be contented with a suspensory bandage, and find very little inconvenience from it.

"Sometimes it arises to so large a size, and gets into such a state, as to become an object of surgery, and to require our very serious attention.

"In general, (says Pott) while it is of moderate size, the state of it is as follows. The scrotal bag is free from all appearance of disease; except that when the skin is not corrugated, it seems rather fuller, and hangs rather lower on that side than on the other, and if suspended lightly on the palm of the hand, feels heavier: the testicle, with its epididymis, is to be felt perfectly distinct below this fulness, neither enlarged, nor in any manner altered from its natural state: the spermatic process is considerably larger than it ought to be, and feels like a varix, or like an omental hernia, according to the different size of the tumour: it has a

pyramidal kind of form, broader at the bottom than at the top: by gentle and continued pressure it seems gradually to recede or go up, but drops down again immediately upon removing the pressure; and that as freely in a supine, as in an erect, posture: it is attended with a very small degree of pain or uneasiness; which uneasiness is not felt in the scrotum, where the tumefaction is, but in the loins.

"If the extravasation be confined to what is called the spermatic process, the opening in the tendon of the abdominal muscle is not at all dilated, and the process passing through it may be very distinctly felt; but if the cellular membrane, which invests the spermatic vessels within the abdomen, be affected, the tendinous aperture is enlarged; and the increased size of the distended membrane passing through it, produces to the touch, a sensation, not very unlike that of an omental rupture.

"While it is small, it is hardly an object of surgery; the pain or inconvenience which it produces being so little, that few people would chuse to submit to an operation to get rid of it; and it is very seldom radically curable without one: but when it is large, or affects the membrane within the cavity, as well as without, it becomes an apparent deformity, is very inconvenient both from size and weight, and the only method of cure which it admits is far from being void of hazard. The plan is to make a free incision into the swelling." (See *Pott on Hydrocele.*)

THE ENCYSTED HYDROCELE OF THE TUNICA COMMUNIS.

"This species of hydrocele (Pott remarks) has its seat in the same part as the preceding, viz. the tunica communis, or cellular membrane, which invests the spermatic vessels; with this difference, that, in the former, the water is diffused in general through all the cells of the membrane; whereas, in this, it is contained in one cavity only. If any of the three kinds of hydrocele deserves the name of encysted, it is this. The water, which constitutes it, being all contained in a bag, formed in the same manner as all the coats of all encysted tumours are, viz. by mere pressure and condensation of the common membrane.

"It is a complaint by no means infrequent, especially in children. It was very well known to many of the ancients, and has been very accurately described by Albucasis, Celsus, Paulus Ægineta, &c.; but later writers have often mistaken it for, and represented it as, a species of wind-rupture, or pneumatocele; a disease existing in their imaginations only. It most frequently possesses the middle part of the process, between the testicle and groin, and is generally of an oblong figure; whence it has by some people been compared to an egg, by others to a fish's bladder. Whether it be large or small, it is generally pretty tense, and consequently the fluctuation of the water within it, not always immediately or easily perceptible; for which reason it has been supposed to contain air only. It gives no pain, nor (unless it be very large indeed) does it hinder any necessary action. It is perfectly circumscribed; and has no communication, either with the cavity of the belly above, or that of the vaginal coat of the testicle below it. The testis and its epididymis, are perfectly and distinctly to be felt below the tumour, and are absolutely independent of it. The upper part of the spermatic process in the groin is most frequently very distinguishable. The swelling does not retain the impression of the fingers; and when lightly struck upon, sounds as if it contained wind only. It undergoes no alteration from change of the patient's posture; nor is affected by his coughing, sneezing, &c. and has no effect on the discharge per anum.

"These marks (while the disease is simple and uncombined with any other) are sufficient to distinguish it by, from all others which may affect the same part; but it sometimes happens, that the present complaint is found connected either with a true hernia, or with a hydrocele of the tunica vaginalis; by which the case is rendered complex, and less easy to be understood.

"In this, as in every other case where, from a complication of symptoms and appearances, a combination of diseases may be suspected, there is but one method of investigating the truth; which is, to consider carefully what disorders the part aggrieved is naturally liable to; what the distinct symptoms and appearances of each of those are; and what are the effects of the present complaint. The two diseases with which this kind of hydrocele is most likely to be combined are, an hydrocele of the tunica vaginalis testis, and a true hernia; the parts within the groin, the spermatic process, and the scrotum being the seat of all three.

"One mark, or characteristic of an hydrocele of the tunica vaginalis testis is, that it possesses and distends the inferior part of the scrotum; and that the testicle being nearly (though not absolutely) surrounded by the water, it very seldom happens, that the former can be clearly and plainly distinguished by the fingers of an examiner; whereas, in the encysted collection, in the membranes of the cord, the tumour is always above the testicle,

which is obvious and plain to be felt below it.

"Another circumstance worth attending to is, that although the fluid in a hydrocele of the vaginal coat does so nearly surround the testis as to render it often not very easy to be distinguished, yet the different parts of the tumour have always a very different feel: for instance, in all those points where the vaginal tunic is loose, and unconnected with the tunica albuginea, the tumour is soft and compressible, and gives a clear idea of the contained fluid; but when these two coats are continuous, or make one and the same membrane, and have no cavity between them (which is the case on the middle and posterior part) there will always be found a hardness and firmness very unlike to what is to be found in all those places, where the distance between the two tunics leaves room for the collection of a fluid: now the hydrocele of the cord being formed in the mere cellular membrane of it, is the same to the touch in all the parts of the tumour, and feels like a distended bladder through every point of it.

"The free state of the upper part of the spermatic process, while the tumour is forming below; the gradual accumulation of the fluid, and consequently the gradual growth of the swelling; the indolent and unaltering state of it; its being incapable of reduction, or return into the belly from the first; its being always unaffected by the patient's coughing, or sneezing; and the uninterrupted freedom of the fecal discharge per anum, will always distinguish it from an intestinal hernia; and he who mistakes it for an omental one, must be very ignorant, or very heedless.

"Now, although there may not always be such external marks as may, to the eye, explain the combination of these diseases with each other; yet the particular seat and symptom of each being known, and the sensations which they produce to the fingers of an intelligent examiner being well understood, when such mixed characteristics are found in the same subject, we may reasonably conclude the case to be complex, and act accordingly.

"I have indeed seen an encysted hydrocele, situated so high toward the groin, as to render the perception of the spermatic vessels very obscure, or even impracticable; but then, the state and appearance of the testicle, and the absence of every symptom proceeding from confinement of the intestinal canal, were sufficient marks of the true nature of the complaint.

"Infants are much more subject to this disease than adults; though it often affects the latter.

"In young children, it frequently dissipates in a short time, especially if assisted by warm fomentation, and an open belly.

"If it does not disperse, that is, if it be not absorbed, the point of a lancet will give discharge to the water; and, in young children, will most frequently produce a cure: but in adults, the cyst formed by the pressure of the fluid does sometimes become so thick, as to require division through its whole length; which operation may in general be performed with great ease, and perfect safety." Mr. Pott says, in general, because it is most frequently so: though he has seen even this, slight as it may seem, prove troublesome, hazardous, and fatal. (See *Pott on Hydrocele.*)

Sir James Earle has proposed curing this case, in the same way as the hydrocele of the tunica vaginalis, viz. by an injection of red wine and water. This gentleman has succeeded in this manner himself. (See *Earle on Hydrocele, p.* 154, *edit.* 2.)

HYDROCELE OF THE TUNICA VAGINALIS TESTIS.

"The third species of this disease, (as Pott describes) is that which is confined to the vaginal coat, or bag, which loosely envelopes the testicle. In a natural, healthy state, its cavity always contains a small quantity of a fine fluid, exhaled from capillary arteries, and constantly absorbed by vessels appointed for that purpose.

"This fluid, in the natural small quantity, serves to keep the tunica albuginea moist, and to prevent a cohesion between it and the vaginalis; a consequence, which almost necessarily follows any such diseased state of these parts, as prevents the due secretion of it. On the contrary, if the quantity deposited be too large, or if the regular absorption of it be by any means prevented, it will be gradually accumulated, and, by distending the containing bag, will form the disease in question."

It is a disease from which no time of life is exempt; not only adults are subject to it, but young children are frequently afflicted with it; and infants sometimes born with it. What is the immediately producing cause, Mr. Pott will not take upon him to affirm. Ruysch is of opinion, that it proceeds from a varicose state of the spermatic vessels. What real foundation there may be for such conjecture, Mr. Pott cannot say; certain it is, that the spermatic vessels are very frequently found varicose in persons afflicted with the hydrocele; but whether such state of these parts ought to be regarded as a cause, or as an

effect of the disease, is a matter worth enquiring into.

"In Morgagni, are some observations on the state of the parts concerned, particularly the inside of the tunica vaginalis, and outside of the albuginea; which, if repeated and confirmed, may possibly lead us on to farther information.

"Whatever tends to increase the secretion of the fluid into the sacculus, beyond the due and necessary quantity, or to prevent its being taken up, and carried off, by the proper absorbent vessels, must contribute to its production; which is so slow, and gradual, and at the same time so void of pain, that the patient seldom attends to it, until it has arrived to some size. Not but that it sometimes is produced very suddenly; and in a very short space of time attains considerable magnitude.

"The size and figure of the tumour (continues Pott) are various in different people, and under different circumstances. In general, at its first beginning, it is rather round; but as it increases, it frequently assumes a pyriform kind of figure, with its larger extremity downward: sometimes it is hard, and almost incompressible; so much so, that, in some few instances, it has been mistaken for an induration of the testicle: at other times, it is so soft and lax, that both the testicle, and the fluid surrounding it, are easily discoverable. It is perfectly indolent, in itself; though its weight does sometimes produce some small degree of uneasiness in the back. The transparency of the tumour, the great characteristic (as it is called) of this disease, and on which almost all writers have agreed to lay the greatest stress, and to rest their proof of the nature of the disorder, is, according to Pott, the most fallible, and uncertain sign belonging it: it is a circumstance which does not depend upon the quantity, colour, or consistence of the fluid constituting the disease, so much as on the uncertain thickness, or thinness of the containing bag, and of the common membranes of the scrotum.

"If (adds this celebrated writer) they are thin, the fluid limpid, and the accumulation made so quick as not to give the tunica vaginalis time to thicken much, the rays of light may sometimes be seen to pass through the tumour: but this is accidental, and by no means to be depended upon. Whoever would be acquainted with this disorder, must learn to distinguish it by other, and those more certain marks; or he will be apt to fall into very disgraceful, as well as pernicious blunders. The colour of the fluid is very different and uncertain; sometimes it is of a pale yellow, or straw-colour; sometimes it is inclined to a greenish cast; sometimes it is dark, turbid, and bloody; and sometimes it is perfectly thin and limpid.

"In the beginning of the disease, if the water be accumulated slowly, and the tunica vaginalis thin and lax, the testicle may easily be perceived; but if the said tunic be firm, or the water accumulated in any considerable quantity, the testis cannot be felt at all; and other symptoms, or marks must be attended to. In most cases, the spermatic vessels may be distinctly felt at their exit from the abdominal muscle, or in the groin; which will always distinguish this complaint from an intestinal hernia, the disease which it is most likely to be confounded with. It does indeed now and then happen, that the vaginal coat is distended so high, and is so full, that it is extremely difficult, nay, almost impossible, to feel the spermatic process: and it also sometimes happens, that the same kind of obscurity is occasioned by the addition of an encysted collection of water in the membrane of the cord; or by the case being combined with a true enterocele. These circumstances are not very frequent, but yet do occur often enough to render it well worth while to mention them; and to signify that, when they are met with, recourse must be had to other marks.

"The two coats of the testicle, the tunica vaginalis and tunica albuginea, are so inseparably united at the posterior and superior, or rather the posterior and middle part of the tumour, that no fluid can collect between them; and, in operating, a puncture, or incision, made here, cannot only do no service, as it cannot reach the water, but must injure the testicle, or epididymis, and do great mischief.

"This natural connexion, between the two tunics, at the upper and hinder part, is the reason (says Pott) why, in a simple hydrocele, that part of the tumour feels so very unlike to every other. In that, the tunica albuginea, and vaginalis, being immediately continuous, no water can get between them; and therefore, the fingers of an intelligent examiner must immediately discover the firmness and hardness arising from the union of these parts: in all others, the two membranes being unconnected, and affording a void space for the collection of water, the fluctuation of it will always be distinguishable.

"This must for ever discriminate the simple hydrocele of the tunica vaginalis, from the anasarcous swelling of the scrotum; from the encysted hydrocele of the cord; and from the intestinal hernia. The first is every where equal, tumid and soft; and every where equally receives and retains the impression of the fingers: the second, though circumscribed, not

very compressible, and affording the sensation of fluctuation, yet does not pit, and is alike to the touch in all parts of it: and in the third, if the testicle be distinguishable at all, it is found at the inferior part of the whole tumour.

"An indurated or scirrhous testicle (continues this author) has indeed, very frequently, a quantity of fluid lodged in its vaginal coat (hydro-sarcocele;) which is a circumstance (says Pott) not to be wondered at; the diseased state of the gland being sufficient to account for the non-execution of the absorbent faculty, and consequently, for the collection of the water. But although part of this mixed tumour is undoubtedly owing to a fluid, and such fluid as is lodged within the vaginal coat, yet it is a very different disease from the true simple hydrocele, and ought not to be confounded with it; one of these marks of the latter being the natural, soft, healthy state of the testicle; and the characteristic of the former, being its diseased and indurated enlargement."

Mr. Pott does not mean that, in a true simple hydrocele, the testicle is never altered from its natural state. He knows the contrary, and that it is often enlarged in size, and relaxed in structure, and that the spermatic vessels are frequently varicose. But, the testicle is never indurated. These two diseases are extremely unlike each other, and require very different treatment. That which would cure a simple hydrocele would dangerously aggravate the hydro-sarcocele.

Mr. Pott observes, that "it may, and does sometimes become necessary to let out the water from the vaginal coat of a testicle, in some degree diseased; but this should always be done with caution, and under a guarded prognostic; lest the patient be not only disappointed, by not having that permanent relief, which, for want of better information, he may be induced to expect; but be also (possibly) subjected to other unexpected inconveniences from the attempt.

"When the disease is a perfect, true, simple hydrocele, the testicle, though frequently somewhat enlarged, and perhaps loosened in its vascular texture, is nevertheless sound, healthy, and capable of executing its proper office; neither is the spermatic cord any way altered from a natural state, except that its vessels are generally somewhat dilated; neither of which circumstances are objections either to the palliative or radical cure of the disease. But in those disorders, which in some degree resemble this, the case is different; either the testicle, or spermatic cord, or both, bearing evident marks of a diseased state.

METHODS OF CURING THE HYDROCELE OF THE VAGINAL COAT.

"The methods of cure (says Pott) though various, are reducible to two, (viz.) the palliative, or that which pretends only to relieve the disease in present, by discharging the fluid; and the radical, or that which aims at a perfect cure, without leaving a possibility of relapse. The end of the former is accomplished by merely opening the containing bag in such manner as to let out the water: that of the latter cannot be obtained, unless the cavity of that bag be abolished, and no receptacle for a future accumulation left. One may be practised at all times of the patient's life, and in *almost* any state of health and habit: the other lies under some restraints and prohibitions; arising from the circumstances of age, constitution, state of the parts, &c.

"The operation by which the fluid is let out, is a very simple one. The only circumstances requiring our attention in it, are, the instrument wherewith we would perform it; and the place or part of the tumour, into which such instrument should be passed.

"The two instruments in use, are the common bleeding-lancet, and the trocar.

"The former having the finer point, may possibly pass in rather the easier, (though the difference is hardly perceptible) but is liable to inconveniences, to which the latter is not. The trocar, by means of its cannula, secures the exit of the whole fluid without a possibility of prevention; the lancet cannot. And therefore it frequently happens when this instrument is used, either, that some of the water is left behind; or that some degree of handling and squeezing is required for its expulsion; or, that the introduction of a probe, or a director, or some such instrument, becomes necessary for the same purpose. The former of these may in some habits be productive of inflammation: the latter prolongs what would otherwise be a short operation, and multiplies the necessary instruments; which, in every operation in surgery, is wrong. To which it may be added, that if any of the fluid be left in the vaginal coat, or insinuates itself into the cells of the scrotum, the patient will have reason to think the operation imperfect, and to fear that he shall not reap even the temporary advantage which he expected. The place where this puncture ought to be made, is a circumstance of much more real consequence; the success of the attempt, the ease, and even sometimes the safety of the patient, depending upon it.

"All the anterior and lateral parts of

the vaginal coat are loose and detached from the albuginea; in its posterior and superior part, these two tunics make one; consequently the testicle is, as it were, affixed to the posterior and superior part of the cavity of the sac of an hydrocele; and consequently, the water or fluid can never get quite round it. This being the state of the case, the operation ought always to be performed on that part of the tumour, where the two coats are at the greatest distance from each other, and where the fluid must therefore be accumulated in the largest quantity; and never on that part of it where the fluid cannot possibly be. The consequence of acting otherwise, must not only produce a disappointment, by not reaching the said fluid; but may prove, and has proved, highly and even fatally mischievous to the patient.

"After performing this operation, present practitioners content themselves with a bit of lint, and a plaster; and if the scrotum has been considerably distended, they suspend it in a bag truss; and give the patient no farther trouble.

"In most people, (continues Pott) the orifice thus made heals in a few hours, (like that made for blood-letting;) but in some habits and circumstances, it inflames and festers: this festering is generally superficial only, and is soon quieted by any simple dressing; but it sometimes is so considerable, and extends so deep, as to affect the vaginal coat, and by accident produce a radical cure. Mr. Pott has also seen it prove still more troublesome, and even fatal: but then the circumstances both of the patient, and of the case, have been particular.

"Wiseman and others have advised deferring the puncture, till a pint of fluid has collected. When there is a sufficient quantity, however, to keep the testicle from the instrument, there can be no reason for deferring the discharge; and the single point on which this argument ought to rest, is this: Whether the absorbent vessels, by which the extravasation should be prevented, are more likely to reassume their office, while the vaginal coat is thin, and has suffered but little violence from distention; or after it has been stretched and distended to ten or perhaps twenty times its natural capacity; and by such distention is (like all other membranes) become thick, hard, and tough? Mr. Pott thinks the probability so much more on the side of the former, that he should never hesitate a moment about letting out the water, as soon as he found, that the puncture could be made securely. And from what has happened within the small circle of his own experience, he is inclined to believe, that if it was performed more early than it generally is, it might sometimes prevent the return of the disease."

The palliative cure should in general be performed at least once on those, who determine to undergo a radical one, as it gives an opportunity of examining the state of the testis, and also of permitting the cavity to be filled again only to such a size, as may be thought to be best calculated to insure success in any future operation. (*Sir James Earle on the Hydrocele, p.* 13, *edit.* 2.)

Upon the subject of performing the operation of tapping hydroceles, Professor Scarpa gives us some useful cautions. The analogy, which exists between large scrotal herniæ and hydroceles of considerable size, led this writer to suspect, that, in the latter disease, the displacement and separation of the vessels of the spermatic cord from each other might also happen. Careful investigations, made upon the dead subject, fully justified the conjecture. In all considerable hydroceles, he found the spermatic vessels so displaced and separated, that the artery and vas deferens were ordinarily situated on one side of the tumour, and the veins on the other. Sometimes these vessels all extended over the lateral parts of the tumour, as far as its anterior surface, principally towards the bottom.

It is well known, that, in many instances, the operation of puncturing a hydrocele has been followed by a large extravasation of blood within the tunica vaginalis; but, Scarpa informs us, that until lately, he was unacquainted with any case of this kind, which was well detailed and authentic enough, to be cited as an example of injury of the spermatic artery in the puncture of a hydrocele. This learned Professor, however, has had such a fact recently communicated to him by Gasparoli, a distinguished surgeon of Pallanza, who, in introducing the trocar into the lower part of the swelling, had the misfortune to injure the spermatic artery, and the patient was afterwards castrated. The wound of this vessel was most clearly proved by the particulars of the case, as detailed in Scarpa's work, to which I must refer the reader.

"From the accurate knowledge, (says Scarpa) which we now have upon this pathological point, such an accident may be avoided, by observing the rules, which are elsewhere given for opening the sac of a very large scrotal hernia. In this last operation, as well as that of puncturing an old and voluminous hydrocele, care must be taken to introduce the instrument at a considerable distance from the bottom of the tumour, that is to say, a little below its middle part, and on a

line, which would divide the swelling longitudinally into two perfectly equal parts. Experience proves, that, for the purpose of completely emptying an hydrocele, it is unnecessary to make the puncture very near the bottom of the tumour. The corrugation of the scrotum, and a slight pressure, made by the surgeon's hand, will suffice for discharging all the fluid contained in the tunica vaginalis, even when the puncture is made at the middle part of the swelling. (*Scarpa, Traité des Hernies*, p. 64—68.)

RADICAL CURE OF THE HYDROCELE.

Six different operations have been practised for this purpose; viz. the incision, the excision, the application of caustic, the introduction of a tent, the employment of a seton, and injecting some stimulating fluid into the cavity of the tunica vaginalis.

The principle, on which the success of every plan of this kind depends, is the excitement of such a degree of inflammation in the tunica vaginalis, and tunica albuginea, forming the cavity which contains the water, as shall end in a mutual and general concretion of those membranes with each other, by which, it is evident, the receptacle for a future accumulation of fluid is completely obliterated.

All the above plans are not equally eligible. Some of them, indeed, are now quite exploded; some, which are still practised by a few, are not more successful, though certainly more severe, than one, which will be presently recommended; others are very uncertain in their effect, as well as painful.

Incision.

Making an incision, so as to lay open the cavity containing the fluid, is the most ancient method, being described by Celsus. Paulus Ægineta says, the incision is to commence at the middle of the tumour, and be carried to the upper part of it, in a line parallel to the raphe. This incision is only to go through the integuments; the bag, which contains the water, is then to be opened, and part of the sides of the sac taken away. A director is next to be introduced, and a division of the tunica vaginalis made to the bottom of the swelling. The cavity is afterwards to be dressed with lint, and healed by granulations. Hildanus, Dodonæus, Wiseman, Cheselden, Heister, and Sharp, all coincide in stating the dangerous and even fatal consequences sometimes following this mode. Mr. B. Bell, who preferred this operation to every other one, acknowledges that he has seen it produce great pain and tension of the abdomen, inflammation, and fever. Pott observes, that it can never be said to be totally void of danger, and that it bears the appearance of an operation of some severity. This eminent surgeon abandoned the method, during the last twenty-six years of his life. Severe as it is, it has also been known to fail, as Sabatier and Earle have confirmed.

Excision.

Albucasis gave the first clear account of this operation, though Celsus has certainly mentioned removing some of the sac. White and Douglas used to adopt this method. The latter advises making two incisions, so as to form an oval, from the upper to the lower part of the tumour; dissecting off the oval piece of the scrotum, and then making an opening into the sac, and enlarging it with scissars. The tunica vaginalis was next to be entirely cut away, close to where it is connected with the spermatic vessels. The cavity was afterwards filled with lint. Sir James Earle justly notices, that this plan must have been tedious, exquisitely painful in the performance, and, as subsequently treated, attended with violent and dangerous symptoms.

Caustic.

Paulus Ægineta advises destroying the skin with a cautery of a particular form, dissecting off the eschar, and then cauterizing the exposed membrane. Guido de Cauliaco is, perhaps, the first who described the application of caustic for the cure of the hydrocele. Wiseman practised this method. Dionis advises it; but, De la Faye and Garengeot make objections to it. Mr. Else has left the best account of the manner of using caustic. He recommends laying "a small caustic upon the anterior and inferior part of the scrotum, which is intended to affect, and, if possible, penetrate through the tunica vaginalis."

The objections to the employment of caustic are, its causing an unnecessary destruction of parts, and producing a tedious painful sore. The action of caustic can never be so regulated as to make an opening with certainty through the tunica vaginalis, so that either its application must sometimes be repeated, or else a lancet, or trocar used after all. Its success is also less sure, than that of an injection; but, it is preferable to all the other methods, except this latter, and, perhaps, the seton.

Tent.

This is first mentioned by Franco. The operation consists in making an opening into the tunica vaginalis, and keeping the wound open with a tent of

lint, linen, or sponge, so as to make the cavity suppurate, in which the water was contained. Paré, Guillemau, Covillard, Ruysch, Heister, and Marini, have all described the plan, with some variations, one of which consisted in smearing the tents with irritating substances. The famous Monro devised the plan of keeping a cannula in the tunica vaginalis; so as to bring on a cohesion of the parts, without suppuration. Fabricius ab Aquapendente, however, has made allusion to some surgeons before him, who used to keep the wound open a few days with a cannula. Mr. Pott tried the cannula, but found it very inconvenient, as its inflexibility hurt the testis whenever the patient moved with inattention, and, consequently, he preferred a tent, or bougie, though he speaks of the plan as a very uncertain one.

Of late, M. Larrey, in consequence of having seen several instances, in which the symptoms, following the use of an injection, were violent, and one case, in which a fatal peritonitis was produced by this mode of treatment, has recommended, exciting the necessary degree of inflammation by keeping a short piece of an elastic gum catheter in the puncture, which instrument also serves afterwards to let any fluid escape from the tunica vaginalis. (*Mém. de Chirurgie Militaire, Tom.3, p.409, &c.*) This author, of course, speaks of the plan as having fully answered his expectations; but, I much doubt, whether it has any particular superiority over several of the former methods of employing the tent; methods, which the wisdom, arising from past experience, has long since rejected.

Seton

Is first mentioned by Guido de Cauliaco, 1363, as a means of curing the hydrocele. In modern times, Pott preferred it to every other method, if we except injection, of which, according to Sir J. Earle, he expressed his approbation before his decease. Mr. Pott found, that the best mode of making the seton was, as follows. He employed three instruments: the first was a trocar, the cannula of which was about one-fourth of an inch broad. The second was what he called the seton-cannula, which was made of silver, was just small enough to pass with ease through the cannula of the trocar, and five inches long. The third instrument was a probe 6½ inches long, having at one end a fine steel trocar point, and, at the other, an eye, which carried the seton. The seton consisted of so much white sewing-silk, as would just pass easily through the cannula, and yet fill it. The thickness of the seton, however, was not so great in the latter part of his practice. Having pierced the inferior and anterior part of the tumour with the trocar, withdrawn the perforator, and discharged the water, Mr. Pott used to pass the seton-cannula through that of the trocar, to the upper part of the tunica vaginalis, so as to be felt there. The probe, armed with the seton, was next conveyed through the latter cannula, and its point pushed through the upper part of the tunica vaginalis and scrotum. The silk was then drawn through the cannula until a sufficient quantity was brought out of the upper orifice. The two cannulæ being withdrawn, the operation was finished.

Injection.

Dr. Monro attributes the first use of injections for the radical cure of hydroceles to an army-surgeon of his own name, who first used spirits of wine. This produced a cure, but, the inflammation was so violent, that he afterwards tried a milder injection, which consisted of wine. However, M. Lambert, above a century ago, in his *Œuvres Chirurgicales*, published at Marseilles, advised injecting a solution of sublimate in lime-water, and he has related cases of success. Mr. Sharp also made trial of spirit of wine, which cured the hydrocele, but, not without causing dangerous symptoms, and two subsequent abscesses in the scrotum. (*Operations of Surgery.*) Douglas, Le Dran, and Pott, all disapprove of injections, in their works; though Sir James Earle informs us, that the latter lived to alter his opinion on the subject.

The violence of the inflammatory symptoms, consequent to the first employment of injections for the radical cure of hydroceles, arose from the fluids used being too irritating. Sir James Earle, at last, preferred wine for several reasons. He found, that it had been used with success in France; its strength is never so great as to render it unsafe; and it may be readily weakened. This injection, in short, produces less pain, than any other mode of cure, does nothing more than is intended, and is as certain as any plan.

"I have commonly used (says Sir James Earle) about two-thirds of wine to one-third of water; if the parts appeared insensible, and no pain at all was produced by the first quantity thrown in, I have withdrawn the syringe, and added to the proportion of wine; on the contrary, if the complaint was recent, and the parts irritable, I have increased the proportion of water, so that I have hitherto been principally guided by the degree of sensation, which the patient has expressed. I have lately used pure water mixed with wine, and found it answer as well as when astringents were added."

(P. 103. *Treatise on the Hydrocele, Edit.* 2.) In the preface, the author says, that he has long disused the pipe with a stop-cock, which he once employed, on account of not being well able to spare a hand, during the operation, to turn it, and its consequently being found awkward. A pipe, one end of which is made to fit into the cannula of a trocar, the other adapted to receive the neck of an elastic bottle, with a valve, or ball, in the center of the pipe to permit the entrance, and prevent the exit, of the injection, will be found infinitely more convenient and useful. (*Earle.*) When the hydrocele is very large, Sir James recommends simply letting out the fluid, and waiting, till the tumour acquires a more moderate size, before attempting the radical cure by injection.

It appears from Sir James Earle's interesting cases, that a cure may be accomplished in this manner, even when the tunica vaginalis is considerably thickened. The following is the common mode of operating: the hydrocele is to be tapped with a trocar at its anterior and inferior part, and, when the whole of the fluid is evacuated, the cavity of the tunica vaginalis is to be distended to its former dimensions with the above injection. This is to be allowed to remain in the part about five minutes, upon the average, after which it is to be discharged through the cannula. The patient usually feels some pain in the groin, and about the kidneys, on the injection being introduced; which symptoms are rather desirable, as they evince, that the stimulus of the fluid is likely to have the wished-for effect of exciting the necessary degree of inflammation. This plan, now brought to so high a pitch of perfection by Sir James Earle, may be deemed almost an infallible means of obtaining a permanent cure; and being the mildest method, also, is, of course, universally preferred.

The treatment after the operation is exactly like that of the common swelled testicle (see *Hernia Humoralis*), consisting of the use of fomentations, poultices, saline purges, and, above all, of a bag truss for keeping up the scrotum.

There is a particular case, that has been called the *congenital hydrocele*, by which is implied a collection of water in the tunica vaginalis, in consequence of there being a preternatural communication between it and the cavity of the peritonæum. Desault used to cure this disease by a red-wine injection. Any protruded viscera being returned into the belly, and the opening between that and the inside of the tunica vaginalis being carefully compressed and closed by a trusty assistant, this celebrated surgeon, after letting out the water in the common way, used to throw in the injection. The method is said to succeed, without causing the perilous consequence, one might *à priori* expect, viz. inflammation of the peritonæum. (See *Desault par Bichat.*)

This kind of hydrocele, has not been described by most writers. The case is easy of discrimination from the fluid being capable of being pushed into the belly. The French state, that this disease admits of a cure by injections, first taking care to press the upper part of the cord, so as to keep the injection from coming into contact into the peritonæum. A successful instance of this practice is related, by which a boy was cured both of a congenital hydrocele and hernia. The patient was nine years old, and had in his scrotum, ever since he was born, a fluctuating semi-transparent tumour, which was free from pain, of the size of a large egg, and disappeared, when compressed, and in a horizontal posture.—(See *Œuvres Chir. de Desault, Tom.* 2, *p.* 442.)

The success of the vinous injection in hydroceles of the tunica vaginalis, in encysted ones of the chord, and in other cases, in which Sir James Earle has tried it, particularly in a large ganglion, and a collection on the patella, makes it probable, that it will be found extensively useful in all cavities, where we wish to procure an adhesion, without destruction of parts. (*Earle, p.* 158, *edit.* 2.)

One caution it is necessary to offer, before taking our leave of this subject; it has sometimes happened, during the operation, that the cannula has slipped out of the tunica vaginalis, and its inner mouth become situated in the substance of the scrotum, in which event, the operator, if he persists in propelling in the injection, will fill the cellular texture of the part with a stimulating fluid, which may cause sloughing, and other unpleasant symptoms, without entering the cavity of the tunica vaginalis, or affording the least prospect of a radical cure of the hydrocele. When such an accident happens, it is best to defer the operation, till a sufficient quantity of fluid has collected again. Hydroceles have been cured by applying to the scrotum a solution of sal ammoniac in vinegar and water. (*Keate.*) But, the application frequently creates a good deal of pain and irritation, and does not often succeed, to say the best of it. (*Earle.*)

For information, relative to the hydrocele, the reader is particularly referred to *Monro on the Tumours of the Scrotum, in the Edinb. Med. Essays, Vol.* 5. *Pott on the Hydrocele; Else on the Hydrocele; Keate; B. Bell; Douglas; and Sir James Earle on the same. Mémoire sur l'Hydroce e*

par Bertrandi, in Mém. de l'Acad. de Chirurgie, Tom. 3. Also the same author in Tratto delle Operazioni di Chirurgia. Nizza, 1763. Remarques, &c. sur diverses especes d'Hydrocele, en Œuvres Chirurgicales de Desault, Tom. 2. Sharp's Treatise on the Operations, and his Critical Enquiry. Also Sabatier in Médecine Opératoire, Tom. 1. Scarpa, Traité des Hernies, p. 64, &c. Larrey, in Mémoires de Chirurgie Militaire, Tom. 3, p. 409, &c. Practical Observations on the Sclerocele, &c. by T. Ramsden, surgeon to Christ's Hospital, &c.

The mode of distinguishing a hydrocele from a scrotal hernia, as explained by Pott, is described in the article *Hernia*.

HYDROPHOBIA. (from ὕδωρ, water, and φοβέω, to fear.) *A dread of water.* This being a striking symptom of that species of madness, which results from the bite of a mad dog, and some other animals affected in the same way, the disease itself has been named *Hydrophobia*. Some have used the more general term, *hygrophobia*, from ὑγρὸν, liquid.

Both these terms are highly objectionable, because they are derived from a symptom, which does not exclusively belong to the disease, nor constantly exist in it.

The old writers, as we learn from Cælius Aurelianus, used the terms *aërophobia*, or a *dread of air*, and *pantophobia*, or, a *fear of all things*, as appropriate names for the disease, since the impression of cold air sometimes excited terror, and the disorder is marked by a singular degree of general timidity and distrust. Others called it *phobodipson* (δίψος, signifying thirst,) because the patient is *thirsty*, yet *fears* to drink. Several modern authors, however, objecting to an appellation expressive only of one symptom, have more correctly denominated the disease *rabies*, and *rabies canina*, or canine madness. The French call it *la rage*. (*Rees's Cyclopædia, art. Hydrophobia.*) Aristotle is the first writer, that expressly mentions this disorder; but, he appears to have had a very imperfect idea of it, since he sets down man as exempt from the danger of being affected by it.

Animals of the dog kind, including the wolf and the fox, are most frequently the subjects of rabies; and some writers have maintained, that, although it may be received and propagated by other animals, yet it always originates with some of the canine race. (*Hillary on Diseases of Barbadoes, p. 246.*) Wrong notions, of a very dangerous tendency, have been generally entertained, in regard to the disease, as it appears in the canine race. The writer of the article *Dog*, in Dr. Rees's Cyclopædia, appears to have had most extensive opportunities of observing the disorder in dogs, having paid attention to more than two hundred cases. From his remarks, I have collected the following information.

The peculiar symptom, which characterises the complaint in the human subject, has been applied to the disease in the dog, and has occasioned it to be called by the same name, hydrophobia. This is a palpable misnomer; for, in no instance, does there ever exist any dread of water; on the contrary, dogs are in general very greedy after it. Such unfounded supposition has often conduced to a very fatal error; for, it being the received opinion, that no dog is mad, who can lap water, many persons have been lulled into a dangerous security. Another equally false and fatal idea has prevailed, that every mad dog must of course be wild and furious; but, this is so far from being true, that, in the greater number of instances, there is very little of that wild savage fury, that, is expected by the generality of persons. "Hence," says this author, "as it is evident, that the term hydrophobia, characterising the affection in the dog, is a misnomer, so it is evident, that the term madness is equally so. In no instance, have I ever observed a total alienation of the mind; in very few, have the mental faculties been disturbed. The disposition to do mischief is rather an increased irritability, than absence of sense; for, in most instances, even those that are furious, they acknowledge the master's voice, and are obedient." The symptom, which is most frequently first observable in a rabid dog, is a certain peculiarity in his manner; some strange departure from his usual habits. In a very great number of instances, the peculiarity consists in a disposition to pick up straws, bits of paper, rag, threads, or the smallest objects, which may happen to be on the floor. This is said to be particularly common in small dogs. "Others again shew an early peculiarity by licking the parts of another dog. In one instance, the approach of the disease was foretold, by our observing a very uncommon attachment in a pug puppy, towards a kitten, which he was constantly licking; and likewise the cold nose of a healthy pug, that was with him. An attachment to the sensation of cold appears in many cases, it being very common to observe them (the dogs) licking the cold iron, cold stones, &c. Some dogs, early in the disease, will eat their own excrement, and lap their own urine." An early antipathy to strange dogs and cats is very commonly observed, but, particularly to cats. As the disease advances, the affected dogs bite those with which they are domesticated, and, lastly, the persons around; but, except in a moment of irri-

tability they seldom attack the human subject. The irritability, that induces them to bite is very strong; but, is devoid of wildness. It is more like peevishness, than fury. A stick held up at them always excites their anger in a violent degree, and, throughout the disease, there is generally a wonderful impatience of controul, and the animals are with great difficulty frightened. (See *art. Dog in Rees's Cyclopædia.*)

For additional details, relating to the disease as it appears in the dog, I must refer to the paper, which has been just now quoted. Enough, I hope, has been said to make the reader aware, that mad dogs are not particularly characterised by an inability to lap water, or any degree of fury. These animals, when actually affected with rabies, from their quiet manner, have even not been suspected of having the disorder, and have even been allowed to run about, fondled, and even slept with. (See *Mem. of Swedish Acad.* 1777.)

The causes of this peculiar distemper in dogs are at present in much obscurity, and we have little more, than conjecture upon the subject. We do not positively know, whether rabies sometimes originates spontaneously in these animals, or, whether, like small pox, in the human species, it is propagated only by contagion. That the disease is frequently imparted in consequence of one dog biting another, every body well knows. But, still, there are many instances, in which it is certain, that no such cause can be suspected. Several facts tend to shew, that among dogs the disease is often communicated by contagion. It is observed, that, in insular situations, dogs are seldom affected, and this circumstance is ascribed to such animals being in a kind of quarantine. The celebrated sportsman, Mr. Meynell, secured his dogs from the malady, by making every new hound perform a quarantine before he was suffered to join the pack. (See *Trans. of a Society for the Improvement of Med. and Chir. Knowledge, Vol.* 1, *art.* 17.) Great heat is very commonly supposed to be an exciting cause of the disease in dogs; but, without much foundation. "A very hot climate, or one exposed to the extremes of heat and cold; a very hot and dry season; feeding upon putrid, stinking and maggotty flesh; want of water; worms in the kidnies, intestines, brain, or cavities of the nose," are set down by Boerhaave as causes of the disease.—(*Aphorism*, 1134.) We learn from Dr. J. Hunter, that in the hot island of Jamaica, where dogs are exceedingly numerous, not one was known to go mad during forty years. (*Transactions of a Society for the Improvement of Medical Knowledge, loc. cit.*)

"Although (says M. Larrey) hydrophobia is more frequent in warm, than temperate climates, it is not observed in Egypt, and the natives assured us, that they knew of no instance, in which this disease had manifested itself either in man, or animals. No doubt, this is owing to the species and character of the dogs of this country, and their manner of living.

"It is remarked, that the Egyptian dogs are almost continually in a state of inaction: during the day, they lie down in the shade, near vessels, full of fresh water, prepared by the natives. They only run about in the night time; they evince the signs and effects of their love but once a year, and only for a few instants. They are seldom seen coupled. On our arrival, there was a vast number of these animals in Egypt, because, they were held, like many others, in great veneration, and were never put to death. They do not go into the houses: in the day time, they remain at the sides of the streets, and they only wander into the country at night, in order to find any dead animals, which happen to be unburied. Their disposition is meek and peaceable, and they rarely fight with each other. Possibly, all these causes may exempt them from rabies." (*Larrey, in Mém. de Chir. Militaire, Tom.* 2, *p.* 226.)

In Mr. Meynell's account, which was communicated to him by a physician, it is asserted, that the complaint never arises from hot weather, nor putrid provisions, nor from any cause except the bite; for, however dogs have been confined, however fed, or, whatever may have been the heat of the season, the disorder never commenced, without a possibility of tracing it to the preceding cause, nor was it ever introduced into the kennel, except by the bite of a mad dog. This malady is also stated to be rare in the northern parts of Turkey, more rare in the southern provinces of that empire, and totally unknown under the burning sky of Egypt. At Aleppo, where these animals perish in great numbers, for want of food and water, and the heat of the climate, this disorder was never known. In other parts of Africa, and in the hottest zone of America, dogs are said to be never attacked with madness. (See *art. Dog, in Rees's Cyclopædia.*)

Mr. Gillman endeavours to prove, that the disease in dogs is probably produced independently of particular climates, of putrid aliment, of deficiency of water, of want of perspiration, or, of the worm under the tongue, to which it has been at different times ascribed, and he expresses

his belief, that it originates somewhat like typhus in the human subject, and is not always produced by inoculation by means of a bite. He thinks, that it may be occasionally brought on by the confinement of dogs, without exercise, in close and filthy kennels; and that the success of Mr. Trevalyan, as related by Dr. Bardsley, in clearing his kennel of the disease, by changing even the pavement, after other means of purification had failed, affords presumptive evidence in favour of the opinion; and, consequently, this author thinks, that the method of quarantine, adopted by Mr. Meynell, and recommended by Dr. Bardsley, on the supposition, that the disease originates exclusively from contagion, will not be a sufficient preventive alone; and he shews, from some facts, reported by Mr. Daniel, that the poison sometimes lies dormant in dogs four, five, and six months; and, consequently, he infers, that the period of two months is not a sufficient quarantine, before a new dog is introduced into a pack. (See *Gillman's Diss. on the Bite of a Rabid Animal.*)

It is observed by the late Dr. J. Hunter, that all domestic animals, birds, as well as beasts, are susceptible of the poison of the mad dog; and, indeed, our experience has not yet taught us that there is any race of animals exempted from its effects. Whether every animal labouring under the disease is capable of infecting others, or whether this power is confined to a few only, we are yet to learn.

The disease has been communicated to the human species by dogs, cats, wolves, and foxes. The dog, the wolf, and the jackal, have, by the late inquiries of naturalists, (*Mr. Hunter's paper, Phil. Trans. Vol.* 77, *p.* 253.) been ascertained to be of the same species; and therefore it is probable, from analogy, that the latter is capable of communicating the infection as well as the two former. The fox also has a strong affinity to the dog, and is by Linnæus counted of the same *genus;* but the distinctions of natural history will not avail us here; for the cat, an animal of a very different *genus*, has often produced the hydrophobia in the human species. Many other animals are reported to have the power of infecting others, by biting them while labouring under the disease themselves; but the facts hitherto collected are very vague, and lead to nothing conclusive on this head. Were we to judge from analogy, from seeing two animals so different from each other as the dog and the cat, capable of infecting others, we might be led to infer, that every animal susceptible of the disease had the power of communicating it, provided their natural habits led them to bite and tear with their teeth such animals as came in their way while in an enraged state. But, though there are instances of men labouring under hydrophobia biting some of those employed in taking care of them, no ill consequences have been known to follow. From this, however, we can draw no positive inference, for it is but a small proportion of such persons as are bit by dogs undoubtedly mad, who are infected with the poison.

The bite only serving the purpose of inoculation, the danger arising from it will be various, as it happens to be in a part more or less vascular; or as the teeth are more or less loaded with the poison. There is the greatest danger from bites in the face, and the symptoms come on soonest; bites in the hands also, which are generally bare, are full of danger. In other parts of the human body the clothing, by wiping the teeth, greatly lessens the danger of infection. The bite is not essentially necessary for the application of the poison: a dog, by licking a sore, produced the hydrophobia; but he licked it till it bled, so that the poison came in contact with the newly divided blood-vessels. This circumstance, if we may judge from the analogy of other poisons, is probably of importance in giving efficacy to the poison, yet it is not clear that it is essential; for there are two cases of the disease mentioned in the Philosophical Transactions, (*Phil. Trans. Vol.* 23, *p.* 1074.) which arose from putting the hands in the mouth of a puppy that was mad, but when there was no bite; and there is a similar case in the Memoirs of the Royal Academy of Sciences of Sweden. (*Anno* 1777.) It is true, various other modes of infection are narrated by writers, but in all of them there is much appearance of fabulous credulity. There is good reason to think that tetanus has sometimes been mistaken for hydrophobia, and given rise to the accounts of the diseases proceeding from the bite of a cock, the claw of a cat, and similar histories.

Dogs are much more susceptible of the infection than the human species. Four men and twelve dogs were bit by the same mad dog, and every one of the dogs died of the disease, while all the four men escaped, though they used no other means of prevention but such as we see every day to fail. There is also an instance of twenty persons being bit by the same mad dog, of whom only one had the disease.

There is a question which naturally presents itself here; does the disease ever arise spontaneously in the human species? The facts relating to this question involve many doubts. Francis Stannier

died in November 1787, with the symptoms of hydrophobia, though it was not known that he had ever been bitten by a mad dog; (*London Med. Journal, Vol.* 9, *p.* 256.) and similar cases are related by writers. Yet as a large bite is no way necessary to communicate the infection, the patient above-mentioned may have been slightly bit, without knowing it, as he was often drunk, and frequently in the streets at night. There is good reason to believe that the difficulty of swallowing, which sometimes occurs in tetanus, has been mistaken for hydrophobia in some cases; and there may be other spasms about the throat and the œsophagus, which may so far resemble hydrophobia, as to give rise to errors on this subject. Something of this kind occurred once to Dr. John Hunter, in an hysteric woman. Were we to be guided by analogy in deciding the present question, we should be led to deny the existence of spontaneous hydrophobia; for where is there an example of any of those diseases which depend upon a specific poison, as the small-pox, the venereal disease, or the measles, arising spontaneously? But the full decision of this question must be left to future experience and observation. (*Dr. J. Hunter in Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge, Vol.* 1, *p.* 299—303.)

Dr. Heysham has defined hydrophobia to be an aversion and horror at liquids, exciting a painful convulsion of the pharynx, and occurring at an indeterminate period after the canine virus has been received into the system. Dr. Cullen places it in the class *neuroses*, and order *spasmi*, and defines it a loathing and great dread of drinking any liquids, from their creating a painful convulsion of the pharynx, occasioned most commonly by the bite of a mad animal. Others have suggested the following definition, as more complete: melancholy, dread of cold air, of any thing shining, and particularly of water; often arising from the bite of a mad animal. (*Parr's Med. Dict.*) However, the latter definition is, perhaps, equally objectionable, because there is not invariably a dread of shining bodies. (See *Dr. Powell's Case*, *p.* 8.)

Writers in general have divided hydrophobia into two stages, viz. the *melancholy*, and the *raving*; the *hydrophobia simplex*, and *rabiosa*, of Cullen. In many instances, however, the latter stages of the disorder are not preceded by any condition, to which the epithet melancholy is applicable.

With regard to the symptoms of hydrophobia, they are generally tardy in making their appearance, a considerable, but a very variable space of time usually elapsing between their commencement and the receipt of the bite. This interval in the greater number of instances appears to be about six weeks. Out of a table of 131 cases, none of the patients became ill before the eleventh day after the bite, and only three before the eighteenth. Dr. Hamilton thinks nineteen months the longest interval, to which any credit can be given. (*On Hydrophobia, Vol.* 1, *p.* 113.) On the other hand, Dr. Bardsley, of Manchester, has recorded a case, in which the most careful enquiries tended to prove, that the patient had never suffered the least injury from any animal, except the bite, inflicted twelve years previous to the commencement of the hydrophobia, by a dog apparently mad. (*Mem. of Liter. and Phil. Society of Manchester, Vol.* 4, *Part* 2, *p.* 431.) The wound, if treated by common methods, usually heals up at first in a favourable manner. At some indefinite period, and, occasionally, long after the bitten part seems quite well, a slight pain begins to be felt in it, now and then attended with itching, but generally resembling a rheumatic pain. It soon extends from the wound up the arm, and affects the situation of the trepezius muscle, and the neck, on the same side as the bite. The cicatrix, in the mean while, begins to swell, inflames, and, at length, discharges an ichorous matter. There are often pains of a more flying, convulsive kind, felt in various parts of the body. As the disease advances, the patient complains of the pain shooting, from the situation of the bite, towards the region of the heart. A lassitude, a dull pain in the head, and a vertigo, soon come on: the patient is commonly melancholy, though not always, mutters, is forgetful, and drowsy; his mind seems disordered; his temper irritable and irregular; his slumbers disturbed, and convulsive agitations immediately follow his waking; a deafness is sometimes complained of; the eyes are watery; the aspect sorrowful; the face pale and contracted; sweat breaks out upon the temples; and an unusual discharge of saliva is made from the mouth. From the beginning, a peculiar stricture and heaviness on the breast, occasional involuntary sighing, and nausea, take place. There is often a bilious vomiting. The idea of drinking any kind of fluids creates considerable alarm and agitation, and the attempt to do so generally brings on most afflicting pains and convulsions, attended with a dreadful sense of suffocation, and choaking. Dr. Marcet, in relating the case of a patient affected with hydrophobia, observes, that "on our proposing to him to drink, he started up, and recovered his breath by a deep convulsive inspiration; yet, he expressed much regret, that he could not drink, as he conceived, it would give him great relief,

his mouth being extremely parched and clammy. On being urged to try, however, he took up a cup of water in one hand, and a tea-spoon in the other. The thought of drinking out of the cup appeared to him intolerable; but, he seemed determined to drink with the spoon. With an expression of terror, yet, with great resolution, he filled the spoon, and proceeded to carry it to his lips; but, before it reached his mouth, his courage forsook him, and he was forced to desist. He repeatedly renewed the attempt; but, with no more success. His arm became rigid and immoveable, whenever he tried to raise it towards his mouth, and he struggled in vain against this spasmodic resistance. At last, shutting his eyes, and, with a kind of convulsive effort, he suddenly threw into his mouth a few drops of the fluid, which he actually swallowed. But, at the same instant, he jumped up from his chair, and flew to the end of the room panting for breath, and in a state of indescribable terror." (See *Medico-Chirurgical Transactions*, *Vol.* 1, *p.* 138.) Even the splashing, or running, of any liquid causes a great deal of inconvenience. As the system becomes more and more affected, the patient loses his sleep entirely, and has frequent and violent fits of anxiety and loud screaming from slight causes. The woman, whom Dr. Powell attended, was often attacked in this way, in consequence of so trivial a circumstance as a fly settling on her face. The noise of tea-cups, or the mention of any sort of drink greatly disturbed her, though she was not at all agitated by the sound of her urine. The currents of air entering her room, whenever the door opened, became very distressing to her, and this more and more so. The pain in her neck became so great, that she could scarcely bear it to be touched; but she made use of a looking-glass without the inconvenience which hydrophobic patients usually suffer from the sight of shining bodies. Dr. Powell states, that the paroxysms which this poor woman suffered, resembled those of hysteria, and increased in duration as the disorder lasted. "She described their commencement to be in the stomach, with a working and fulness there, and that a pricking substance passed up into her throat and choaked her; she screamed suddenly, and grasped firmly hold of her attendants, as if voluntarily; and muscular convulsions came on, which were sometimes more, sometimes less general and violent. The causes from which these paroxysms arose, were extremely slight; the passage of a fly near her face, the attempt to swallow a pill, a stream of air, the sight of oil or wine, or any other liquids, even the sound of water, and other such circumstances, were sufficient; she now also complained of inconvenience from light, which was accordingly moderated. The effect of sounds was peculiar; for, though in the subsequent stages, their influence became more general, at this period the effect was rather proportionate to the ideas they excited in her mind, than to their violence. Bells, and other strong noises, did not agitate her, but the clatter of earthen ware, the noise of a distant pump, or any thing connected with liquids, produced the paroxysms in all their violence." She could swallow fresh currants with less resistance than any thing else, taking care that they were perfectly dry. Her mind had, till now, been quite calm and composed, and her conversation and behaviour proper, during the intervals of the convulsive attacks. But Dr. Powell was obliged to discontinue the pills of argentum nitratum, in consequence of the sufferings which the attempt to swallow them regularly brought on. Fifteen grains of this substance had been given without any sensible effect. The fits and the irritability to external objects, increased. The pain shot from the back of the neck, round to the angles of the jaws, the chin, and throat. At length, the paroxysms became more frequent, and, indeed, might be said to come on spontaneously: seven occurred in one hour. She looked pale and exhausted, and a tremor and blueness of her lips and fingers were observable; her pulse became weaker and more rapid, and her scalp so tender, that touching it brought on convulsions. She had, latterly, eructations of wind, and spit up some thick viscid saliva. Her urine now came away involuntarily, and she was more and more irritable and uncontrollable. She now passed two hours in almost constant convulsions; became extremely irritable and impatient of every thing about her, complained of failure of her sight; wished to be bled to death; her words were fewer and interrupted; she struck, and threatened to bite, her attendants; had copious eructations of air; discharged an increased quantity of viscid saliva with much convulsive effort; said the affection of her throat and stomach had quite left her; and continued in a general perspiration, with a weak pulse from 140 to 150. She afterwards bit some of the attendants, and was therefore confined with a waistcoat. From this period, she had lost all control over her mind, and continued for almost four hours in a paroxysm of furious insanity. She now swallowed, with an effort, near half a pint of water: but this was, in a few seconds, vomited up, with some mucus, and a greenish fluid. In this violent raving state, she continued till within two hours

of her death, which took place forty-seven hours after the first marked occurrence of hydrophobia. In the course of the case, she swallowed once, or twice, a little porter; and also some cinnamon-water, with tinct. opii; but they were always vomited up. On opening the body, the most remarkable appearances were, a turgid state of the vessels of the brain; great distention of the intestines with air; the œsophagus rather redder than natural, and covered with a thin layer of coagulating lymph; nearly half a pint of greenish fluid in the stomach, which was rather redder than natural, and had under its internal coat, near the cardia, a few spots of extravasated blood. (*Dr. Powell's Case of Hydrophobia.*)

The dread of swallowing liquids, though the most singular symptom of the disease, constitutes but a small part of the malady. It is true, that none, or very few recover, who have this symptom, yet, they certainly do not die, in consequence of the difficulty of swallowing liquids; for, the human body could easily exist double the time, in which the disease usually proves fatal, without food, or drink. Besides, the sick can often swallow substances, that are nourishing, in a pulpy state, without, however, having their life thereby at all prolonged. It is not, therefore, the difficulty, or impossibility of swallowing liquids; but the effects of the poison upon the constitution at large, which occasions death. (*Dr. J. Hunter in Trans. of a Society for the Improvement of Med. Knowledge, Vol.* 1, *p.* 305.)

The extreme sensibility of the sick to all impressions, appears in the displeasure which they express at even the air blowing upon them; in their dislike to a strong light; in their aversion to new faces, or even the sight of their friends and relations; and in the terror they express at being touched, which almost threatens to throw them into convulsions. As the disease advances, the mind is more and more filled with dreadful fears and apprehensions. (*Op. cit. p.* 307.)

The duration of life, from the appearance of the hydrophobia till death, varies from thirty-six hours to four or five days: the most common period is from two to three days. (*Op. cit. p.* 308.)

The dread of water is said to be sometimes a symptom of certain fevers, from topical inflammations of the thorax, or neighbouring parts. (*Edinburgh Medical Commentaries, Vol.* 2, *p.* 331.) A species of hydrophobia has been known to originate from an inflammation of the stomach. (*Med. Essays, Vol.* 1.) Also from the bite of an epileptic patient, or of persons in violent fits of passion; and from the accession of epilepsy. An inferior degree of it is said to be observable in some hysteric cases, when, from the difficulty of swallowing, patients are fearful of taking liquids. In the latter cases, musk and opium are recommended.

With respect to the treatment of hydrophobia, arising from the canine poison, little is necessary to be said in this work, because the subject is rather medical than surgical. The reader will regret my brevity the less, when he is informed, that, after hydrophobia has once begun, it has always pursued its dreadful course to a fatal termination, without any one well authenticated instance to the contrary, notwithstanding the trial of every medicine, and method, which the ablest practitioners have suggested. The only case, that I have ever perused, which seemed really to be one, in which hydrophobia was cured, was published in a Calcutta paper, of December, 1811. The treatment, if my memory fails me not, consisted in mercurial frictions, and copious and repeated bleedings. The particulars, I believe, however, are likely to be made public in one of the periodical works, long before this edition of the dictionary will be completed. If this were a true case of hydrophobia, it is extraordinary, that a method, which has been often and often tried in other instances, should have answered in this particular one. The same observation, in regard to the inefficacy of every mode of treatment hitherto known, might, perhaps, be accurately extended to every internal remedy, mercurial frictions, plunging the patient for a considerable time under water, &c. as preventives. The instances, in which a prevention has been inferred to have taken place by different writers, in consequence of such means, may all be very rationally ascribed to other circumstances. It is well known, that, out of the great number of persons, frequently bitten by the same dog, only a few are commonly affected. The hydrophobic poison is known to reside in the saliva of the animal; consequently, the chance of being affected must greatly depend upon the quantity of this fluid which may be insinuated into the wound; and, if the teeth of the animal should have previously pierced a thick boot, or other clothing, before entering the skin, the danger must obviously be in general much diminished. Many patients wash and suck the wound, immediately after its occurrence, and thus, no doubt, very often get rid of the poison. Even when it has lodged in the wound, it may not be directly absorbed, but be thrown off with the discharge. All prudent patients submit to excision of the bitten part. Now, under each of the above circumstances, escapes have frequently occurred, while internal medicines, half drowning, or sa-

livating the patients, had also not been neglected, so that all the efficacy of preventives has too often been most unjustly ascribed to means, which probably never yet had, nor ever will have, any beneficial effect whatever. What confirms the truth of the preceding statement are these facts; that persons bitten by the same animal have sometimes been treated exactly on the same plan; some of them have escaped having the disease; others have had it, and, of course, perished: on other occasions, some of the patients, bitten by the same animal, have been treated in a particular way, and have escaped hydrophobia, while others bitten at the same time by the animal, also never had any constitutional effects, although they took no medicines, nor followed any other particular plan.

Happily, there is, in surgery, one means of preventing hydrophobia, when it is practised in time, and in a complete manner. Every reader will know, that the excision of the bitten parts is the operation to which I allude. Indeed, as hydrophobia is often several months before it begins, the wounded parts should, perhaps, always be cut out, even though they are healed, and some weeks have elapsed since the accident, provided no incipient symptoms of hydrophobia have already commenced. The operation should be done completely; for a timorous surgeon, who should fear to cut deeply enough, or to cut a sufficient quantity of the surrounding flesh away, would be a most dangerous one for the patient. All hopes of life depend on the prevention of the disorder; for, in the present state of medical knowledge, none can rest upon the efficacy of any plan, except the extirpation of the part. This some have done with caustics. However, as their action can never be regulated with the same precision as that of the knife, and, consequently, they will not always destroy the flesh to a sufficient depth, excision should always be preferred. The latter method is also the safest, for another important reason, viz. the part, and poison lodged in it, are removed from the body at once; but, when caustic is used, the slough will not be thrown off for some days afterwards.

Some surgeons of the present day are not content with cutting out the part; they recommend, after the operation, filling the wound with the aqua ammoniæ puræ, so as to produce a general sloughing of its surface, by way of greater security.

I shall conclude this article with referring the reader to the following works, for farther information on hydrophobia: *Sauvages sur la Rage; James on Canine Madness; Mead on the Bite of a Mad-dog; Seleg, Nugent, and Hamilton, on Hydrophobia; Medical Museum, Vol. 2; London Medical Transactions, Vol. 2; Med. Obs. and Inq. Vol. 3; Edinb. Med. Comment. Vol. 5, p. 42; Vaughan's Two Cases of Hydrophobia; Dr. Powell's Case of Hydrophobia; Latta's System of Surgery, Vol. 3; Cullen's First Lines, Vol. 4; Memoirs of the Med. Society of London, Vol. 1, p. 243; Medical Communications, Vol 1; Mem. of the Royal Society of Medicine in Paris, Supplement to Vol. 4. Ferriar's Med. Facts and Observations. Richerand's Nosographie Chirurgicale, Tom. 1, p. 251, &c. Edit. 2. Marcet, in Medico-Chirurgical Transactions, Vol. 1, p. 132, &c. Lassus, Pathologie Chirurgicale, Tom. 2, p. 239, &c. Edit. 1809. A valuable paper by Dr. John Hunter in Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge, Vol. 1, Art. 17. Gillman's Dissertation on the Bite of a Rabid Animal. Levéillé, Nouvelle Doctrine Chirurgicale, Tom. 2, p. 341, &c. Bardsley in Memoirs of the Literary and Philosophical Society of Manchester, Vol. 4, Part 2. Balington, in the Medical Records and Researches, Lond. 1798.*

HYDROPHTHALMIA. (from ὕδωρ, water; and ὀφθαλμος, the eye.) *Dropsy of the eye.* In all the cavities of the animal body (says Scarpa) which are continually moistened by a serous vapour, as well as in those destined to contain a determinate quantity of an aqueous, limpid fluid, there is such a reciprocalness of action, between the secerning extremities of the arteries, and the minute mouths of the absorbent vessels, that the fluid effused in these cavities is always in circulation, being incessantly renovated, but never accumulating beyond a certain degree and determinate measure. When this mutual action, existing between these two vascular systems, is interrupted, in consequence of a general or local indisposition, the above cavities, being no longer moistened by a serous vapour, shrivel and become obliterated; or, on the contrary, being unusually distended by the excessive quantity of fluid, they acquire an enormous magnitude, much beyond what a person, unacquainted with these things, would suppose.

As Scarpa continues, the eye, considered simply as a cavity destined to contain a certain quantity of limpid fluid, is occasionally subject to both these infirmities. The first is termed *atrophy*; the second, *dropsy of the eye*, or *hydrophthalmia*. In the first case, the globe of the eye gradually becomes smaller; and, as the absorbent system does not cease acting, when there is no more fluid to be absorbed, it gradually consumes the solid parts of this organ, which it insensibly diminishes, and in time destroys. In the second case, the eye assumes a greater

bulk than is natural to it; sometimes acquiring such an extraordinary magnitude, that it projects out of the eyelids, at first with great weakness, and afterwards with total loss of sight.

Surgeons generally state, that the immediate cause of the dropsy of the eye, is sometimes an increase of the vitreous humour, sometimes of the aqueous. In every case of this kind, on which Scarpa has performed the operation, and in other examinations of the different stages of the disease, made on the dead subject, he has constantly found the vitreous humour, more or less, altered in its organization, liquified, and converted into water, according as the disease was ancient, or recent. In some instances, he could not distinguish whether the increased quantity of the vitreous or the aqueous humour had most share in the formation of the disease. Some of the most celebrated modern oculists believe, that the principal cause of this complaint is referribl to the closure of the inorganic pores of the cornea, through which the aqueous humour can no longer transude, and consequently collects in the interior of the eye, so as to occasion dropsy. By this assertion, they evince, that they are not sufficiently acquainted with the activity of the absorbent system in the animal economy; and they do not seem to have adverted that, in conformity with their theory, the dropsy of the eye ought invariably to follow a thickening of the conjunctiva spread over the organ, as well as the leucoma and extensive scars of the whole cornea; a thing that is contradicted by daily observation and experience.

Scarpa has also dissected a dropsical eye, taken from the body of a child, three years and a half old, who died of marasmus. The vitreous humour was not only wanting in this eye, and the cavity destined for its reception filled with water, but the vitreous tunic was converted into a substance, partly of a spongy, partly of a lippomatous nature. This dropsical eye was one-third larger than the sound one. The sclerotica was not thinner than that of the other eye; but, in consequence of being yielding, flaccid, and separated from the choroides, it had lost its plumpness, and globular shape. The cornea formed a disk, one-third larger than that of this membrane in a sound state; it did not retain its natural pulpousness, and was obviously thinner than the cornea of the healthy eye. There was a considerable quantity of an aqueous, reddish fluid, between the cornea and iris. The crystalline lens, with its opaque capsule, had been pushed forward a little way into the anterior chamber, but could not advance further, on account of a firm adhesion, which the capsule had contracted with the iris, around the edge of the pupil. As soon as the capsule was opened, the lens issued from it, half dissolved, the rest exceedingly soft. It was impossible to detach the whole of the posteriour layer of the capsule from a hard substance, which seemed to be the altered membrane of the vitreous humour. Scarpa, therefore, slit open the choroides, from the ciliary ligament to the bottom of the eye, when a considerable quantity of a reddish aqueous fluid gushed out, without, however, one particle of the vitreous humour. In lieu of the latter body, there was found a small cylinder of a substance, partly of a fungous, partly of a lippomatous nature, surrounded with a good deal of water, which was effused in the longitudinal axis of the eye, from the entrance of the optic nerve, as far as the ciliary ligament, or that hard substance to which the posteriour layer of the capsule firmly adhered. This little cylinder was covered, for the extent of two lines and a half forwards from the entrance of the optic nerve, by a stratum of whitish matter, reflected on itself, like the epiploon, when raised towards the fundus of the stomach. Scarpa conceived that this stratum of whitish matter was nothing else than the relics of the unorganized retina; for, on pouring rectified spirits of wine on the whole inner surface of the choroides, and the little cylindrical body, he found no vestiges of the retina on this membrane, and that the whitish substance, which was reflected on itself, became very firm, just as the retina does when immersed in spirit of wine. Both the cylinder and the indurated substance, occupying the place of the ciliary body, were manifestly nothing else than the membrane of the vitreous humour, destitute of water, and converted, as was described, into a substance, partly of a spongy, partly of a lippomatous nature. It is not easy to determine whether this fungous and lippomatous degeneration of the vitreous tunic had preceded, or was a consequence of the dropsy of the eye. However, it may be, this fact, in conjunction with several other similar ones, that Scarpa has met with, in which he found no vitreous humour in the posteriour cavity of the eye, but only water, or a bloody lymph, tends very much to confirm that this disease principally consists of a morbific secretion of the vitreous humour, and occasionally, also, of a strange degeneration of the alveolary membrane, by which this humour is formed. Scarpa refers to a similar case in *Medical Obs. and Inquiries, Vol.* 3, *Art.* 14.

The augmentation in the secretion of the aqueous fluid, both in the cells of the

vitreous humour and out of them, after they have been ruptured from excessive distention; together with a debilitated action of the absorbent system of the eye affected; are, most probably, continues Scarpa, the causes of every species of dropsy, and, consequently, of the morb fic accumulation of humours in the eye. From such a lodgment, and successive increase, of the vitreous and aqueous humours, the eye-ball at first necessarily assumes an oval shape, ending at the point of the cornea; then, as the organ enlarges in all dimensions, it acquires a larger size than that of its fellow; so that, in the end, it projects from the orbit in such a manner, that it cannot be covered by the eyelids, and disfigures the patient's face as much as if an ox's eye were placed in the orbit, instead of his own natural one.

This disease (says Scarpa) is sometimes preceded by blows on the eye, or adjoining temple; sometimes by an obstinate internal ophthalmy. In other instances, it is preceded by no other inconvenience except an uneasy sensation of tumefaction and distention in the orbit, a difficulty of moving the eye-ball, and a considerable impairment of sight. Lastly, it is sometimes preceded by none of these causes, or no other obvious one whatever, especially when the complaint occurs in children, of very tender age, from whom no information can be obtained. As soon as the eye has assumed an oval form, and the anteriour chamber has become preternaturally capacious, the iris seems situated further backward than usual, and tremulates, in a very singular way, on the slightest motion of the eye-ball. The pupil remains dilated in every degree of light, while the crystalline is sometimes brownish from the very beginning of the disease; and sometimes it does not become cloudy till the affection has arrived at its highest pitch. The complaint then becomes stationary; and, as the crystalline is not deeply opaque, the patient can distinguish light from darkness, and, in some degree, the contour of objects, and brilliant colours. But, when the eye has acquired a larger volume, and the whole crystalline has become opaque, the retina at last remains in a state of paralysis, from the excessive distention, and, consequently, is no longer sensible to such few rays of light as reach the bottom of the eye, by insinuating themselves at the sides of the lens.

In the last stage of the disease, (continues the above celebrated surgeon) when the dropsical eye projects from the orbit, so as not to admit of being covered by the eyelids, with the inconveniences already enumerated, others associate themselves, arising from the friction of the ciliæ, the secretion of gum, the flux of tears, the ulceration of the lower eyelid, on which the eye rests, and the excoriation of the eye itself. Hence, the dropsical eye is gradually attacked by violent ophthalmies, attended with intolerable pains of the part affected, and of the whole head. The ulceration, also does not always confine itself within certain limits; but continues to spread, first depriving the cornea of its transparency, next consuming the sclerotica, and lastly, destroying progressively the other component parts of the eye-ball.

At the first appearance of the dropsy of the eye, the masters of the art recommend the internal administration of mercurials, the extract of cicuta, and of pulsatilla nigricans; and the external employment of astringent and corroborant collyria, making a seton in the nape of the neck, and compressing the eye, which forms a preternatural projection out of the orbit. As far, however, as Scarpa can judge, from the events of observations made by the best practitioners on this point, he has never yet met with a single well-detailed history of a dropsy of the eye cured by means of the above-mentioned internal medicines. With regard to externals, he has learnt, from his own experience, that, when the disorder is manifest, astringent, and corroborant collyria, as well as compression on the protuberant eye, are highly prejudicial. In such circumstances, making a seton in the nape of the neck, frequently bathing the eye in a lotion of mallows, and applying to it a plaster composed of the same plant, have enabled him to calm, for a time, that disagreeable sense of distention in the orbit, and over the forehead, and temple of the same side, of which patients in this state make so much complaint, especially when they are affected with a recurrence of ophthalmy. But, as soon as the eye-ball begins to protrude from the orbit, and project beyond the eyelids, there is no means of opposing the very grievous dangers, which the dropsy of the eye threatens, except an operation, which consists in evacuating, by an incision, the superabundant humours from the eye, then exciting gentle inflammation of the membrane, and suppuration on the interiour of this organ, so as to make it contract, and shrink into the bottom of the orbit. To defer the operation any longer, would be abandoning the patient to the constant inconvenience of an habitual ophthalmy, the danger of an ulceration of the eye-ball and subjacent eyelid, and, what is worse, of carcinoma of the whole eye, with great peril to the patient.

Scarpa next states, that, in order to fulfil the preceding indication, of evacuating the superabundance of aqueous hu-

mours lodged in the eye, the paracentesis of the eye-ball has been greatly extolled in past times.—Nuck, one of the promoters of this operation, punctured the eye with a trocar, exactly in the centre of the cornea. (*De Duct. Ocul. Aquos, p.* 12[illegible].) It has since been thought better to puncture the eye-ball in the sclerotica, at about two lines from the junction of this membrane with the cornea, that such a small quantity of the vitreous humour may be more easily discharged at the same time with the aqueous, as may be deemed adequate to effect a diminution in the morbific enlargement of the eye-ball.

Notwithstanding the approbation, says Scarpa, which the most celebrated surgeons have conferred on this method of operating for the dropsy of the eye, it has at present fallen into disuse, as insufficient, and ineffectual for the purpose. This will not appear surprising to such as are acquainted with our present knowledge of the animal economy, particularly in regard to the lymphatics, and are not ignorant how little reliance can be put in paracentesis, as a means of curing chronic dropsy in general, especially that of the tunica vaginalis, termed hydrocele. Indeed, the radical cure of the latter is never accomplished, except when the adhesive inflammation takes place in the tunica vaginalis and albuginea, after the evacuation of the fluid, or when these membranes suppurate, ulcerate, or contract an intimate adhesion together, which remove every opportunity, every possibility of a fresh accumulation of water in the scrotum. If it has sometimes happened, that the puncture has radically cured the hydrocele, it is because it has, by some unexpected incident, excited inflammation of the *vaginalis* and *albuginea*, so as to produce a coalescence of these two membranes.

In consequence of these principles, (continues Scarpa) the paracentesis of the eye, directed wholly for the discharge of the superfluity of humours in this organ, can never be a means of curing the dropsy of the part, unless the puncture, made by the trocar, excite, at the same time, inflammation and suppuration, and afterwards a concretion of the membranes composing the eye-ball. Indeed Nuck relates, that in a young man at Breda, on whom he had operated, he was obliged to puncture the eye five several times; that, on the fifth time of doing this, it was necessary to suck through the cannula of the trocar, in order to evacuate the greatest possible quantity of the vitreous humour; and, lastly, that it seemed proper to introduce a plate of lead, between the eyelids and eye-ball, for the purpose of making a continual pressure on the eye, in its empty, shrivelled state. In a woman of the Hague, he mentions that he twice punctured the eye in vain; and that this person submitted, two or three other times, to the same operation, but he omits adding with what degree of success. Scarpa has no difficulty in believing, that a radical cure of the dropsy has sometimes been accomplished by means of the puncture, after the trocar, and other similar hard substances, have been repeatedly introduced into the eye, through the cannula of that instrument; but this success can never be attributed to the mere evacuation of the superabundance of the vitreous and aqueous humour; though it may be referred to that, conjoined with the irritation produced by the cannula, and, consequently, to the adhesive inflammation or suppuration excited in the internal membranes of the eye. It is by no means unlikely, that, after having learnt this practical point from experience, and wishing to insure the success of the paracentesis in the radical cure of the dropsy of the eye, Woolhouse may have directed that, when the cannula is introduced in the eye, it should be rolled at least six times between the fingers; and that Platner, following the same steps, may have proposed to inject a warm fluid through the cannula into the cavity of the eye, after having evacuated the humours, by means of a trocar; and that Mauchart may have directed keeping open the wound made in the eye by the trocar, by means of a small tent of lint. If all these circumstances prove, on one side, the inefficacy of the paracentesis in the radical cure of the dropsy of the eye, they evidently shew, on the other, that the perfect cure of this infirmity can only be achieved by evacuating the humours contained in the eye; and exciting, at the same time, a certain degree of inflammation, and suppuration, of the internal membranes of the organ.

The most easy and expeditious way hitherto known, of obtaining all these advantages, is undoubtedly that which is explained in the account of the radical cure of the inveterate staphyloma, protruding out of the eyelids. (See *Staphyloma.*) With respect to this subject, Scarpa cannot refrain from repeating, at this opportunity, that it is exceedingly disadvantageous, and even dangerous, to make the circular section of the dropsical eye-ball in the sclerotica. In fact, this circular recision, when performed in the sclerotica, is constantly followed by the most aggravated symptoms, particularly, frequent hemorrhages, an accumulation of grumous blood at the bottom of the eye-ball, vehement inflammation of the eye, eyelids, and head, obstinate vomitings, convulsions, delirium, and the most

imminent danger to the patient's life. Such modern surgeons, as have faithfully published the results of their practice on this point, among whom, Marchan (*Journal de Med. de Paris. Janvier*, 1770. *Sur deux Exophthalmies, ou grosseurs contre nature du Globe de l'Œil.*) and Terras, (*Ibidem ; Mars*, 1776. *Sur l'Hydrophthalmie.* next to Louis, (*Mémoires de Chirurg. t.* 13, *p.* 289, 290.) merit infinite praises, have ingenuously declared that, after performing the circular recision of dropsical eyes in the sclerotica, they have had the greatest motives for repenting of what they had done.

The circular section, as broad, or rather broader than a large lentil-seed, is performed at the summit or centre of the cornea of the dropsical eye, according to Celsus's direction relative to the staphyloma, is exempt from the serious consequential symptoms that Scarpa has just mentioned. By means of this operation, which is by no means painful, an opening is made for the evacuation of the humours of the eye, and internal inflammation is, at the same time, excited. These objects are accomplished, also, without occasioning such a sudden subsidence, and emptiness, of the membranes of the whole eye, as necessarily happen when a circular incision is made in the sclerotica, and greatly affect the nerves of this organ, and the parts sympathizing with it, particularly the head and stomach. This intimate sympathy, perhaps, is not the least of the causes producing the fatal consequences above specified; besides those very serious ones, which necessarily result from the almost sudden exposure of a large surface of the deeper part of the eye to the contact of the air, and from the lotions which are, in these circumstances, often employed.

With regard to the manual of the operation, it is exactly the same as what is detailed in the article *Staphyloma*. In the dropsical eye, whether the cornea be transparent or not, since the function of the immediate organ of sight is irrevocably lost, as Scarpa has already stated, the surgeon must introduce a small bistoury across the apex, or middle of the cornea, at one line and a half from its central point; and then, by pushing the instrument from one towards the other canthus of the eye, he will cut the lower part of the cornea in a semicircular manner. The segment of the cornea being next elevated with the forceps, the operator is to turn the edge of the knife upward, and complete the work by a circular removal of as much of the centre of the cornea as is equal, in size, to a large lentil-seed, or three lines in diameter, supposing the patient to be in the adult state. Through this circular opening, made in the centre of the cornea, the surgeon may, by means of gentle pressure, discharge as much of the superabundant humours in the eye, as is requisite to make the eye-ball diminish, and return into the orbit, so as to be covered by the eyelids. As for the rest of the humour lodged in the eye, it will gradually escape of itself, through the circular opening in the cornea, without any more pressure being made.

Until the appearance of the inflammation, that is, until the third or fifth day after the operation, the dressings are to consist of the application of a pledget of dry lint, supported by a retentive bandage. As soon as the inflammation and tumefaction invade the eye operated on, and the eyelids, the surgeon is to employ such internal remedies as are calculated to moderate the progress of inflammation; and he is to cover the eyelids with a bread and milk poultice, which must be renewed at least once every two hours. It is a very frequent phenomenon, both in the staphyloma and dropsy of the eye, that, on the first appearance of inflammation, the eye-ball on which the operation has been done, augments, and protrudes again from the eyelids, in the same way as before the operation. In this circumstance, it is proper to cover the projecting part of the eye-ball with a piece of fine linen, smeared with a liniment of oil and wax, or the yolk of an egg, and oleum hyperici; the application of the bread and milk poultice being continued, as before-mentioned, over this other dressing. Scarpa next states, that when suppuration of the interiour of the eye manifests itself, the swelling of the eyelids at the same time decreases, and the eye-ball diminishes in size, returns gradually into the orbit, and continues to contract itself. This state of suppuration may be known by observing, that the dressings are smeared with a viscid lymph, blended with a portion of the humours of the eye, which incessantly issue from the centre of the cornea; and by noticing the appearance of the margin of the recision, which is changed into a circle of a whitish substance, resembling the rind of bacon. In the progress of the case, this whitish circle, surrounding the place of the recision of the cornea, becomes detached, like a slough, so as to leave a small ulcer, of a very healthy colour. This ulcer, as well as the whole eye-ball, contracts, so as to become entirely closed, and cicatrized, leaving every opportunity for the placing of an artificial eye between the eyelids and the stump of the eye-ball.

Although, in the majority of cases, the circular recision of the centre of the cornea, equal in size to a large lentil-seed, proves sufficient to excite a mild inflammation, and suppuration, in the interiour

of the eye of an adult subject; yet, if this occurrence does not take place on the fifth day, it is useful to expose the eye, on which the operation has been done, to the air; or, as is stated in the article *Staphyloma*, it is useful to remove a circular portion of the cornea, half a line in breadth, or little more, by means of the forceps and curved scissars. This gives the patient neither pain nor any other inconvenience, and produces the desired effect, viz. it makes the interiour of the eye, at length, inflame and suppurate mildly, without which it is impossible to effect a perfect cure. (*Scarpa sulle Principali Malattie degli Occhi, cap.* 13.)

HY'DROPS. (from ὑδωρ, water.) A dropsy, or morbid accumulation of water. For *hydrops articuli*, refer to *Articulation*. With regard to *hydrops pectoris*, *hydrothorax*, or *dropsy of the chest*, as it is altogether a medical case, an account of its symptoms and treatment will hardly be required in this Dictionary. The only concern which a surgeon has with the disease, is being occasionally required to make an opening for the discharge of the water: this operation is described in *Paracentesis Thoracis*.

HYDROSARCOCELE. (from ὑδωρ, water; σαρξ, flesh; and κηλη, a tumour.) A morbid enlargement of the testicle, attended with a collection of fluid in the tunica vaginalis.

HYMEN IMPERFORATE. The inconveniences brought on by such a cause and the mode of relief, are explained in the article *Vagina*.

A continuation of the hymen over a part of the orifice of the meatus urinarius may produce great pain and difficulty in making water, and symptoms, which may give rise to suspicion of there being a stone in the bladder.

The following case illustrates this observation. "In the year 1740, (says Mr. Warner) I was consulted in the case of a little girl, about three years old, who had long laboured under such severe symptoms in voiding her urine, as to make it suspected by her physician, that she had a stone in her bladder. Upon enquiry, I was informed, that her urine came away by drops, that she was inclined to put her hand to the pudendum when she made water, and that, at that time, she could not help crying and stamping with her feet. These symptoms so nearly resembled those of the stone, that I thought proper to propose the passing a staff into the bladder, that we might be satisfied, whether there was a stone, or any other disease of the urethra, or bladder; but, upon endeavouring to do it, I observed, that the urethra was at least half covered over with a continuation of the hymen, which appeared imperforated; for this reason, I could with difficulty execute my design. However, I effected the introduction of the instrument into the bladder, without using much violence; but, there was no stone, nor any other preternatural appearance to be discovered in the bladder, or the urethra. For this reason, I pronounced, that the difficulties and pains, which arose in discharging the urine, probably proceeded from the size and situation of this membrane; which I divided by incision with a small knife," &c. The patient was cured in a few days. (See *Warner's Cases in Surgery, p.* 276, *edit.* 4.)

HYPOPYON, or HYPOPIUM. (from ὑπο, under; and πυον, pus.)

By hypopium (says Scarpa) I imply, with all surgeons, that accumulation of a glutinous, yellowish fluid, like pus, which take place in the anterior chamber of the aqueous humour, and, frequently, also in the posterior one, in consequence of severe, acute ophthalmy, particularly the internal species. I have explained, in speaking of inflammation of the eyes, that, though the severe, acute ophthalmy particularly affects the external parts of the eye, in the majority of instances; yet, it occasionally invades, with equal violence, both the external and internal coats of this organ, especially the choroides and uvea. In this last circumstance, if the inflammatory diathesis, affecting the interior of the eye, be not promptly checked and subdued, by the most effectual chirurgical means, coagulating lymph is extravasated from the highly inflamed choroides and uvea, and gradually, as it is effused into the cavity of the eye, it passes through the pupil, into the chambers of the aqueous humour, and descends to the bottom of the anteriour one, so as to fill sometimes one third, sometimes one half of this space; and, occasionally, to occupy it to such a height, as totally to conceal the iris and pupil.

This viscid matter of the hypopium is commonly called pus; but Scarpa contends that it is only coagulating lymph. The symptoms portending an extravasation of coagulating lymph in the eye, or an hypopium, are the same as those which occur in the highest stage of violent acute ophthalmy: viz. prodigious tumefaction of the eye-lids; the same redness and swelling of the conjunctiva, as in chemosis; burning heat and pain in the eye; pains in the eye-brow and nape of the neck; fever, restlessness, aversion to the faintest light, and a contracted state of the pupil.

As soon as the hypopium begins to form, (says Scarpa) a yellowish semilunar streak makes its appearance at the bottom of the anterior chamber, and, re-

gularly, as the glutinous fluid is secreted from the inflamed internal membranes of the eye, so as to pass through the pupil, and fall into the aqueous humour, it increases in all dimensions, and gradually obscures the iris, first at its inferior part, next, where it forms the pupil, and lastly, the whole circumference of this membrane. As long as the inflammatory stage of the violent ophthalmy lasts, the hypopium never fails to enlarge; but, immediately this stage ceases, and the ophthalmy enters its second period, or that dependent on local weakness, the quantity of coagulating lymph, forming the hypopium, leaves off increasing, and, from that moment, is disposed to diminish.

This fact sufficiently evinces (continues this eminent Professor) how important it is, in order to check the progress of the hypopium, to employ, with the utmost care, the most effectual means for checking and resolving the attack of violent ophthalmy, in its first stage. Copious evacuations of blood, both generally and topically, ought to be speedily put into practice; and when chemosis exists, the conjunctiva should be divided; mild aperients, blisters to the nape of the neck, little bags of emollient herbs, applied to the eye, and other measures of this kind, described on the subject of the first stage of severe acute ophthalmy, ought to be employed. It will be known that they have fulfilled the indication, by noticing that, some days after the adoption of such treatment, though there may still be redness, of the conjunctiva and eyelids, the lancinating pains in the eye abate, the heat considerably diminishes, the fever subsides, quietude and sleep are restored, the motion of the eye becomes free, and, lastly, the collection of viscid matter forming the hypopium, becomes stationary. It is not unfrequent to see, especially among the lower orders of the people, persons affected with the second stage of severe acute ophthalmy, bearing this collection of coagulating lymph, in the chambers of the aqueous humour, with the greatest indifference, and without complaining of any of those symptoms which characterize the acute stage of ophthalmy. It is only at this crisis, or at the termination of the acute stage of violent inflammation of the eye, that the enlargement of the hypopium ceases, and the coagulating lymph begins to be absorbed, provided this salutary operation of nature be not impeded, nor retarded, by any injudicious regimen.

Scarpa states, that persons, little versed in the treatment of diseases of the eyes, would fancy that the most expeditious and efficacious mode of curing an hypopium, after it has become stationary in the second stage of severe acute ophthalmy, would be that of opening the cornea at its most depending part, in order to procure a speedy exit for the matter collected in the chambers of the aqueous humour; especially, as this is also the common doctrine. But experience shews, that dividing the cornea, in such circumstances, is seldom successful, and most frequently gives rise to evils, worse, than the hypopium itself, notwithstanding the modification suggested by Richter, (*Obs. Chir. Fasc.* 1, *Chap.* 12.) not to evacuate the whole of the matter at once, nor to promote its discharge by repeated pressure, and injections, but to allow it to flow slowly out of itself. The wound made at the lower part of the cornea, for evacuating the matter of the hypopium, how small soever the incision may be, most commonly reproduces the severe acute ophthalmy, and occasions a greater effusion of coagulating lymph into the chambers of the aqueous humour, than existed before. Besides, after opening the cornea, the matter of the hypopium, if allowed to escape gradually, and in drops, of its own accord, would be several days in becoming completely discharged, on account of its viscid quality. During this space of time, the glutinous lymph would keep the edges of the wound of the cornea dilated, and make them suppurate. Thus the incision would be converted into an ulcer, through which the aqueous humour, situated behind the coagulating lymph, would escape, and next even a fold of the iris. Opening the cornea, therefore, only converts the hypopium into an ulcer of that membrane, attended with a prolapsus of the iris, and occasionally of the crystalline itself. Nor can any inference be drawn in favour of making an artificial opening during the stationary state of an hypopium in the second stage of severe acute ophthalmy, from the matter of the hypopium having sometimes made its way spontaneously through a narrow aperture in the cornea, with a successful result. For, there is a wide difference, between the effects of a spontaneous opening into a natural, or preternatural cavity of the animal body, or of one made with caustic, and the consequences of an opening, made with a cutting instrument. In the two first methods, the subsequent symptoms are constantly milder, than in the last. Besides, even in the instance, in which a spontaneous exit of the hypopium takes place through the cornea, an escape of the aqueous humour, and a prolapsus of the iris not unfrequently ensue; consequently, the spontaneous evacuation of the hypopium cannot justly form a rule for the treatment of the disease. There is only one case, in which dividing the cornea,

in order to discharge an hypopium, is not only useful, but indispensable: this is, when there is such an immense quantity of coagulating lymph, extravasated in the eye, that the excessive distention, which it produces of all the coats of this organ, occasions such vehement symptoms, as not only threaten the entire destruction of the eye, but, even endanger the life of the patient. But, this particular case cannot serve (says Scarpa) as a model, for the treatment of the hypopium, usually met with in practice.

Besides, if it be certain, that blood extravasated in the eye in consequence of blows, and what is still more remarkable, that even the membranous flakes of the capsular cataract, pushed by the needle from the posterior into the anterior chamber, are insensibly dissolved, and, at length, entirely absorbed, if it be the same with milky, and caseous cataracts, that have been lacerated as much as possible; and even with the crystalline lens itself, when deprived of its capsule, and depressed into the vitreous humour by the operation; (see *Cataract*;) there cannot be a doubt, as Scarpa states, that absorption will take place, in the case of coagulating lymph extravasated into the chambers of the aqueous humour, as soon as the source of this extravasation of glutinous fluid no longer exists, and the lymphatics of the eye have recovered their original energy.

Hence the resolution of the hypopium, by means of absorption, forms the primary indication, at which the surgeon should aim in the treatment of the complaint. We have already observed, that, in order to stop its progress, the only truly efficacious method is to subdue the first shock of the inflammation, and to shorten the acute stage of the severe ophthalmy, by the free employment of the antiphlogistic treatment, and the use of mild, emollient, topical remedies.

If this plan of treatment answer the wishes of the practitioner, (continues Scarpa) as in the majority of cases it does, the incipient collection of coagulating lymph, at the bottom of the anterior chamber of the aqueous humour, not only ceases to augment, but, also, in proportion as the severe ophthalmy disappears, the absorbent system takes up the heterogeneous fluid extravasated in the eye, and the white, or yellow speck, shaped like a crescent, situated at the bottom of the anterior chamber, gradually diminishes, and is at last entirely dispersed. Janin considered the infusion of the flowers of mallows, applied to the eye that is inflamed and affected with this disease, as a specific resolvent in these circumstances (*Mem. et Obs. sur l'Œil, p.* 405;) but, it is now known, that every topical emollient application, provided it be conjoined with such internal antiphlogistic treatment, as is the most proper for repelling the acute stage of the severe ophthalmy, produces quite as good an effect as this infusion. Simple warm water produces the same benefit. "A young girl, (writes the celebrated practioner Nannoni) was struck in the eye by an ear of corn. An inflammation was the consequence, which produced a white pus of a semilunar shape, apparently behind the cornea, without a possibility of judging, whether the matter was actually situated between the laminæ of that membrane, or in the anterior chamber. Hence, I was asked whether it might not be evacuated by an incision, particularly, as the patient complained of great pain in the eye, and eye-brow. She was in the hospital; and in the presence of Dr. Lulli, and several students in surgery, I said that the pain of which the patient complained, was not occasioned by the pus itself, but the cause which produced it. This cause was inflammation, which probably would be increased by making a larger opening for the external air, than what it has to the internal parts, while the external ones remain entire. By fomenting the eye and forehead with warm water, the inflammation subsided, and the pus disappeared. We have so often witnessed the fact subsequently, that we can also extol the simplicity of the treatment." Such, in short, is the happy termination of an hypopium, whenever the disease is properly treated at its commencement, and the acute stage of the severe ophthalmy has been promptly checked, and repelled by internal antiphlogistic means, and emollient applications to the eye. But, in consequence of the inflammatory period of the severe ophthalmy having resisted in an uncommon manner the best means, or because such means have been employed too late, it sometimes happens, that the coagulating lymph, effused in the eye, and collected in the anterior chamber, is so abundant, even after the acute stage of the ophthalmy, that it continues for a long time to cloud the eye, and intercept vision. Scarpa has often seen patients, especially paupers, who from indolence, negligence, or ill treatment, have remained, a long time after the cessation of the inflammatory stage of ophthalmy, with the anterior chamber almost entirely filled with the glutinous matter of hypopium. When the inflammation ceases, these unhappy persons wander about the streets almost quite indifferent, and without complaining of pain, or any other inconvenience, than the difficulty of seeing with the eye affected. In this second stage of the ophthalmy, the resolution of

the hypopium obviously cannot be accomplished by the same means, nor with equal celerity, as in the first. At this crisis, the great quantity, and density of the glutinous matter extravasated, and the atony of the vascular system of the eye, make it necessary to give nature sufficient time, to dissipate the thick, tenacious matter of the hypopium, and, at length, to dispose it to be insensibly absorbed with the aqueous humour which is continually undergoing a renovation. Hence, it is right, (says Scarpa) to adopt those means, which are best calculated to invigorate the debilitated tone of the vascular system of the eye, more especially the lymphatics. This requires more or less time, according as the patient is advanced in years, of a relaxed fibre, and weak; or a young man of good constitution.

However, in the second stage of violent acute ophthalmy, complicated with hypopium, the surgeon, according to Scarpa, should limit his efforts to the removal of every thing, which may irritate the eye, or be likely to renew the inflammation; and he should only employ such means, as are conducive to the resolution of the second inflammatory stage, depending on relaxation of the conjunctiva and its vessels, and such remedies as tend, at the same time, to invigorate the action of the absorbents. Therefore, in this state, he ought first to examine carefully the degree of irritability in the eye affected with the hypopium, by introducing, between the eye and eyelids, a few drops of vitriolic collyrium, containing the mucilage of quince-seeds. Should the eye seem too strongly stimulated by this application, it must not be used, and little bags of warm mallows with a few grains of camphor are to be substituted for it. In the intervals, the vapours of the spir. ammon. comp. mentioned in the article *Ophthalmy*, may be applied, and recourse had again to a blister on the nape of the neck. When the extreme sensibility of the eye is overcome, the simple vitriolic collyrium must be used again, strengthening it afterwards by the addition of a few drops of camphorated spirit of wine. Under such treatment, proceeds Scarpa, the surgeon may observe, that, in proportion as the chronic ophthalmy disappears, and the action of the absorbents is re-excited, the tenacious matter of the hypopium divides first into several small masses; then dissolves still further; and, afterwards, decreases in quantity; depending towards the inferior segment of the cornea; and, finally, vanishing altogether. But Scarpa accurately observes, that the surgeon cannot always expect to be equally successful, whether the disease occur during the first, or second stage of violent acute ophthalmy, if the tenacious lymph, suddenly extravasated in the interior of the eye, prevail in such quantity, as not only to fill, but strongly distend, the two chambers of the aqueous humour, and the cornea in particular. Notwithstanding the most skilful treatment, in this state of the complaint, the unpleasant complication is often followed by another inconvenience, still worse than the hypopium itself; viz. ulceration, opacity, and bursting of the cornea, at that point of its circumference, or centre opposite the pupil, where there is the smallest resistance to the pressure.

The ulceration of the cornea ordinarily takes place with such celerity, that the surgeon seldom has time to prevent it. As soon as an aperture has formed, the excessive abundance of coagulating lymph, contained in the eye, (sometimes named empyema oculi) begins to escape through it, and a degree of relief is experienced. But, this melioration is not of long continuance; for, scarcely is the glutinous fluid evacuated, that distended the whole eye, and especially the cornea, when it is followed by a portion of the iris, which glides through the ulcerated aperture, protrudes externally, and constitutes the disease termed, prolapsus of the iris. (See *Iris, Prolapsus of.*) But, if in such an emergency, the cornea already ulcerated, opaque, and greatly deranged in its organization, should not immediately burst, the surgeon is then constrained by the violence of the symptoms, depending on the prodigious distention of the eye-ball, to make an artificial opening in this membrane, in order to relieve the immense constriction, and even the danger in which life is placed. The practitioner will do this the more readily, as, in such circumstances, there is little hope of preserving the organ of vision. Scarpa adds, that the pain in the eye, and whole head, is often so severe in this case, as to cause delirium.

Were there the least chance of restoring, in any degree, the transparency of the cornea, and the functions of the organs of vision, after opening the cornea, it would certainly be more prudent to make the opening at the lower part of this membrane, as is practised in the extraction of the cataract. But, in the case of empyema of the eye, now considered, in which the cornea is universally menaced with ulceration and opacity, and seems ready to slough, there is no hope of its resuming its transparency at any point. The best, and most expeditious, method of relieving the patient from the terrible pain, which he suffers, is, according to Scarpa, to divide the centre of the cornea with a small bistoury to the extent of a line and a half; then to raise with a pair of forceps the little flap, and cut it

away all round with one stroke of the scissars, so as to make in the middle of this membrane an opening of about the size of a lentil-seed.

The most fluid part of the matter, distending the eye, immediately escapes through this opening, the lips of which cannot close, like those of a simple incision. Successively afterwards, the coagulating lymph, and the crystalline lens, take the same course, and also, in a few days, the vitreous humour. The surgeon should refrain from promoting the escape of the latter by strong pressure on the eyeball; experience proves, that, in such cases, it is best to allow it to flow out spontaneously.

Immediately after the operation, the surgeon must cover the eye with a bread and milk poultice, which is to be renewed every two hours, not neglecting the use of such general remedies, as are calculated, to check the progress of acute inflammation, and to quiet the alarm of the nervous system. In proportion as the interior of the eye suppurates, the eye-ball gradually diminishes, shrinks into the orbit, and at length cicatrizes, leaving things in a favourable state for the application of an artificial eye.

However, Scarpa infers from the whole of what has just been said, that making an incision into the cornea is as dangerous, and useless, in the case of hypopium ordinarily met with in practice, as it is necessary in the instance of empyema of the eye, attended with the aggravating symptoms above-mentioned, and irremediable opacity of the cornea.

The foregoing remarks, which are some of the best ever offered on the subject, were first published by Professor Scarpa in *Saggio di Osservazioni e d'Esperienze, sulle Principali Malattie degli Occhi; Venezia*, 1802. Another excellent writer on hypopium is Richter: see *Anfangsgrunde der Wundarneykunst, Band.* 3. 1795. Consult also *Essays on the morbid Anatomy of the Human Eye: by J. Wardrop, Chap.* 6. *Edinb.* 1808.

HYSTEROTOMIA. (from ὑστερα, the womb, and τεμνω, to cut.) See *Cæsarean Operation.*

I.

IMPERFORATE HYMEN. See *Vagina.*

INCARCERATION. (from *incarcero*, to confine.) This term is usually applied to cases of hernia, in the same sense as strangulation. When the viscera are pressed upon either by the opening through which they protrude, or by the parts themselves within the hernial sac, in such a degree, that the course of the intestinal matter to the anus is obstructed, and nausea, sickness, pain, and tension of the swelling and abdomen, &c. are occasioned, the rupture is said be affected with incarceration, or strangulation.

According to Professor Scarpa, however, an *incarcerated*, and a *strangulated* hernia, do not imply exactly the same thing. In the first case, says he, the course of the intestinal matter is interrupted, without any considerable impairment of the texture, or vitality of the bowel. On the contrary, in the strangulated hernia, besides the obstruction to the course of the fecal matter, there is organic injury of the coats of the intestine, with loss of its vitality. The bowel, that is merely incarcerated, resumes its functions immediately it is replaced in the abdomen; while that, which is truly strangulated, never returns to its natural state. (See *Scarpa's Traité des Hernies, p.* 251.)

This distinction, however, which Scarpa has drawn, is by no means generally adopted, *incarceration*, and *strangulation* being used as synonymous terms.

INCISION. (from *incido*, to cut.) A wound made with a sharp cutting instrument.

INCONTINENCE OF URINE. An inability of the bladder to retain this fluid, which should not be discharged without the concurrence of the will. See *Urine, Incontinence of.*

INDURATION. (from *induro*, to harden.) A morbid hardness of any part.

INFLAMMATION. (from *inflammo*, to burn.) By the term, *inflammation*, is generally understood, the state of a part, in which it is painful, hotter, redder, and somewhat more turgid, than it naturally is; which topical symptoms, when present in any considerable degree, or when they affect very sensible parts, are attended with fever, or a general diseased action of the system. (*Burns.*)

The susceptibility of the body for inflammation is of two kinds; the one *original*, constituting a part of the animal economy, and beyond the reach of human investigation; the other *acquired* from the

influence of climate, habits of life, and state of the mind over the constitution. (*Hunter.*) The first kind of susceptibility, being innate, cannot be diminished by art; the second may be lessened by the mere avoidance of the particular causes, upon which it depends.

Inflammation may, with great propriety, be divided into the *healthy* and *unhealthy*. Of the first, there can only be one kind; of the second, there must be an infinite number of species, according to the peculiarities of different constitutions, and the nature of diseases, which are numberless. (*Hunter.*) Inflammation may also be divided into the *acute* and *chronic*. This division of the subject is one of the most ancient, and seems to have obtained the sanction of all the best surgical writers. Healthy inflammation is invariably quick in its progress, for which reason, it must always rank as an *acute* species of the affection. However, there are numerous inflammations, controlled by a diseased principle, which are quick in their progress, and are, therefore, to be considered as acute. Chronic inflammation, which we shall treat of, when we come to the subject of *tumours*, is always accompanied with a diseased action.

PRINCIPLES OF INFLAMMATION.

There is much foundation for believing, that healthy inflammation is invariably an homogeneous process, obedient to ordained principles, and, in similar constitutions*, similar structures, and similar situations, uniformly assuming the same features. If experience reveals to us, that *here* it is commonly productive of certain effects, and *there* it ordinarily produces different ones, the same unbounded source of wisdom communicates to the mind a knowledge, that there is some difference in the tone of the constitution, or in the structure or situation of the parts affected, assignable as the cause of this variety. The nature of the exciting cause can have no share in modifying the appearances of phlegmonous inflammation, whether this be occasioned by the application of heat, or of mechanical violence to the body. Healthy inflammation is always the same in its nature, and all the influence, which the exciting causes can have, is proportioning the degree of inflammation to their own violence. A modern author (*Dr. Smith, in Med. Communications, Vol. 2.*) makes the nature of the exciting cause one principal ground of the specific distinctions in inflammation, and, with good reason, when he takes into the account the action of morbid poisons, and the qualities of disease in general.

The attentive observation of experience, the only solid basis of all medical, as well as other, knowledge, has informed the practitioner, that parts, which from their vicinity to the source of the circulation, enjoy a vigorous circulation of blood through them, undergo inflammation more favourably, and resist disease better, than other parts, of similar structure, more remote from the heart. The lower extremities are more prone to inflammation, and disease in general, than parts about the chest; when inflamed, they are longer in getting well; and the circumstance of their being depending parts, which retards the return of blood through the veins, must also increase the backwardness of such parts in any salutary process. (*Hunter.*) Healthy inflammation is of a pale red; when less healthy, it is of a darker colour; but, the inflamed parts will, in every constitution, partake more of the healthy red, the nearer they are to the source of the circulation. (*Hunter.*)

Inflammation, when situated in highly organized and very vascular parts, is more disposed to take a prosperous course, and is more governable by art, than in parts of an opposite texture. The nearer also such vascular parts are to the heart, the greater will be their tendency to do well in inflammation. (*Hunter.*) Hence, inflammation of the skin, cellular substance, muscles, &c. more frequently ends favourably, than the same affection of bones, tendons, fasciæ, ligaments, &c. It is also more manageable by surgery; for those parts of the body, which are not what anatomists term *vascular*, seem to enjoy only inferior powers of life, and, consequently, when excited in a preternatural degree, frequently mortify.

But, inflammation of vital parts, though these may be exceedingly vascular, cannot go on so favourably, as in other parts of resembling structure, but, of different functions; because, the natural operations of universal health depend so much upon the sound condition of such organs. (*Hunter.*) The truth of this observation is illustrated in cases of gastritis, peripneumony, &c.

All new-formed parts, not originally entering into the fabric of the body, such as tumours, both of the encysted and sarcomatous kinds, excrescences, &c. cannot endure the disturbance of inflammation long, nor in a great degree. The vital powers of such parts are weak, and when irritated by the presence of inflammation,

* Here strength and weakness are alluded to; for, it is impossible that healthy inflammation should prevail in a diseased constitution.

these adventitious substances are sometimes removed by the lymphatics, but more commonly slough. This remark applies also to substances generated as substitutes for the original matter of the body; for instance, granulations and callus. The knowledge of this fact, leads us to a rational principle of cure in the treatment of several surgical diseases. Do we not here perceive the cause, why very large wens are occasionally dispersed by the application of urine, brine, and similar things, which are now in great repute, on this account, with almost every one out of the profession? How many verrucæ, wrongly suspected to originate from a syphilitic cause, are diminished and cured by a course of mercury! It is the stimulus of this mineral upon the whole system, that accomplishes the destruction of these adventitious substances —not its antivenereal quality. Topical stimulants would fulfil the same object, not only with greater expedition, but with no injury to the general health.

In strong constitutions, inflammation, *cæteris paribus*, always proceeds more propitiously, than in weak ones; for, when there is much strength, there is little irritability. In weak constitutions, the operations of inflammation are backward, notwithstanding the part, in which it is seated, may, comparatively speaking, possess considerable organization, and powers of life. (*Hunter.*)

Healthy inflammation, wherever situated, is always most violent on that side of the point of inflammation, which is next to the external surface of the body. When inflammation attacks the socket of a tooth, it does not take place on the inside of the alveolary process, but towards the cheek. When inflammation attacks the cellular substance, surrounding the rectum, near the anus, the affection usually extends itself to the skin of the buttock, leaving the intestine perfectly sound, though in contact with the inflamed part. (*Hunter.*)

We may observe the influence of this law in the fistula lachrymalis, in diseases of the frontal sinuses, and antrum, and, particularly, in gun-shot wounds. Suppose a ball were to pass into the thigh, to within an inch of the opposite side of the limb, we should not find, that inflammation would be excited along the track of the ball, but, on the side next the skin which had not been hurt. If a ball should pass quite through a limb, and carry into the wound a piece of cloth, which lodges in the middle, equidistant from the two orifices, the skin, immediately over the extraneous body, would inflame, if the passage of the ball were superficial.—(*Hunter.*) Mr. Hunter compared this law with the principle, by which vegetables approach the surface of the earth; but, the solution of it was even too arduous for his strong genius and penetration.

We see three very remarkable effects follow the prevalence of inflammation; viz. adhesions of parts of the body to each other; the formation of pus, or suppuration; and ulceration, a process, in which the lymphatics are more concerned, than the blood-vessels. Hence, Mr. Hunter termed the different stages of inflammation, the *adhesive*, the *suppurative*, and the *ulcerative*.

All parts of the body are not equally liable to each of the preceding consequences. (*Hunter.*)

In the cellular membrane, and in the circumscribed cavities, the adhesive stage takes place more readily, than the others; suppuration may be said to follow next in order of frequency; and lastly ulceration.

In internal canals, on the inner surfaces of the eyelids, nose, mouth, and trachea, in the air-cells of the lungs, in the œsophagus, stomach, intestines, pelvis of the kidneys, ureters, bladder, urethra, and in all the ducts and outlets of the organs of secretion, being what are termed *mucous membranes*, the suppurative inflammation comes on more readily, than either the adhesive, or the ulcerative stage. Adhesions, which originate from the slightest degree of inflammation in other situations and structures, can only be produced by a violent kind in the above-mentioned parts. Ulceration is more frequently met with upon mucous surfaces, than adhesions. (*Hunter.*) The cellular membrane appears to be much more susceptible of the adhesive inflammation, than the adipose, and much more readily passes into the suppurative. (*Hunter.*) Thus we see the cellular substance, connecting the muscles together, and the adipose membrane to the muscles, inflaming, suppurating, and the matter separating the muscles from their lateral connexions, and even the fat from the muscles, while the latter substance and the skin are only highly inflamed. (*Hunter.*) But, it must be allowed, that in situations where fat abounds we very frequently meet with abscesses. This is so much the case, that fat has been accounted a more frequent nidus for collections of matter, than the cellular substance. (*Bromfield.*) Abscesses are particularly liable to form in the neighbourhood of the anus, mamma, &c. We have mentioned above the fat's being highly inflamed; an expression not strictly true. Fat has no vessels, principle of life, nor action of its own; consequently, we cannot suppose it can itself either inflame, or suppurate. We know, that it is itself a secretion, and when an abscess forms in it, we understand, that the mode of action in the vessels, naturally destined to de-

posit fat, has been altered to that adapted to the formation of pus. When we speak of the fat being inflamed, we imply, that the membranous cells, in which it is contained, and by which it is secreted, are thus affected.

The deeply-situated parts of the body, more especially the vital ones, very readily admit of the adhesive stage of inflammation. The circumstance of deeply-seated parts not so readily taking on the suppurative stage of inflammation, as the superficial ones do, is strikingly illustrated in cases of extraneous bodies, which, if deeply lodged, only produce the adhesive inflammation. By this process a cyst is formed, in which they lie without much inconvenience, and they may even gradually change their situation, without disturbing the parts, through which they pass. But, no sooner do these same bodies approach the skin, than abscesses immediately arise. (*Hunter.*)

All inflammations, attended with disease, partake of some specific quality, from which simple inflammation is entirely free. When the constitution allows the true adhesive and suppurative stages to occur, it is to be regarded as the most healthy. Were it in an opposite state, we should see the very same irritation excite some other kind of inflammation, such as the erysipelatous, scrophulous, &c. (*Hunter.*)

In specific inflammations, the position, structure, and distance of the part affected from the source of the circulation, as well as from the surface of the body, seem also to have as much influence as in cases of common inflammation. Upon this point, I feel conscious of being a little at variance with what Mr. Hunter has stated; but the undecided manner in which he expresses himself, not less than the following reflections, encourages me not to desert my own ideas. We see, that venereal eruptions sooner make their appearance upon the chest and face, than upon the extremities. No organized part can be deemed exempt from the attack of common inflammation; many appear to be totally insusceptible of the venereal. We know, that scrophulous diseases of the superior extremities take a more favourable course, require amputation less frequently, and get well oftener than when situated in the inferior ones. (*Ford.*) The venereal disease makes more rapid advances in the skin and throat, than in the bones and tendons; we often see it producing a specific inflammation, and an enlargement of the superficial parts of the tibia, ulna, clavicle, cranium, &c. while other bones, which are covered with a considerable quantity of flesh, are very rarely affected. Gouty inflammation is prone to invade the small joints, the rheumatic the large ones.

SYMPTOMS AND NATURE OF HEALTHY INFLAMMATION, OR PHLEGMON.

Redness, swelling, heat, and pain, the four principal symptoms of phlegmonous inflammation, have been accurately noticed by Celsus*. If we refer to any writer on this interesting part of surgery, we shall find the above symptoms enumerated as characterizing phlegmon. In short, this term is usually applied to a circumscribed tumour, attended with heat, redness, tension, and a throbbing pain. These are the first appearances observed in every case of phlegmon; and when they are slight, and the part affected is of no great extent, they have commonly very little, and sometimes no apparent, influence on the general system. But, when they are more considerable, and the inflammation becomes extensive, a full, quick, and generally a hard pulse, takes place, and the patient, at the same time, complains of universal heat, thirst, and other symptoms of fever. (*B. Bell.*) While the inflamed part becomes red, painful, and swelled, its functions are also impaired. The same degree of inflammation is said to produce more swelling in soft parts, and less in harder ones. (*Burns.*)

Though the redness, swelling, throbbing, tension, and other symptoms of phlegmonous inflammation, are less manifest, when the affection is deeply situated, yet they certainly exist. When persons die of peripneumony, or inflammation of the lungs, the air-cells of these organs are found crowded with a larger number of turgid blood-vessels, than in the healthy state, and of course the parts must appear preternaturally red. Coagulating lymph, and even blood, are extravasated in the substance of these viscera, which become heavier, and feel more solid. (*Baillie.*)

The extravasation of coagulating lymph, which is one of the chief causes of the swelling, is also one of the most characteristic signs of phlegmonous inflammation.

Some writers (*Smith, Med. Commun.*) have confined the seat of phlegmon to the cellular membrane; but, this idea is probably an erroneous one. Had such authors duly discriminated the nature of common inflammation, they would have allowed, that this affection existed, wherever the bloodvessels appeared to be more numerous, and enlarged, than in the natural state, accompanied with an effusion of coagulating lymph, whether upon the surface of a membrane, or a bone, or into the interstices of the cellular substance, and

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* Notæ verò inflammationis sunt quatuor, rubor, et tumor, cum calore et dolore, lib. 3. cap. 10.

attended with acute pain, and a throbbing pulsation in the part affected.

Before proceeding further into the consideration of inflammation, it seems proper to treat of causes.

REMOTE CAUSES.

The remote causes of inflammation are infinite in number; but, very easy of comprehension, because only divisible into two general classes. The first includes all such agents as operate by their stimulant or chemical qualities; for instance, cantharides, heat, &c. The second class of causes are those, which act mechanically, such as bruises, wounds, &c. After this statement, it seems quite unnecessary to give a detail of each particular remote cause *.

Fevers often seem to become the remote causes of local inflammation. In other instances, inflammation appears to arise spontaneously, or, as I should rather say, without any perceptible exciting cause.

The principle on which the application of cold to a part becomes the remote cause of inflammation, is not decidedly known. A modern author offers the following explanation, in lieu of those founded on the doctrines of cold being a stimulus, and a sedative cold may operate on a part in three different ways. First, it may be applied in such a degree, and for such a length of time, as to destroy the vitality of the part directly; in which case, sloughs are formed. Secondly, it may be applied in a less degree, or for a shorter time; and afterwards a stimulant, such as heat, may be applied, which will excite inflammation. The production of inflammation by any agent, depends in a great degree upon the suddenness of the operation of the agent, which excites it; for a quantity of stimulus, which, if suddenly applied, would produce inflammation, may be applied slowly with impunity. Hence, it results, that any given stimulant must more easily produce inflammation in a part, which has a low action, &c. than in one having a vigorous action, &c. Hence, very slight stimuli will induce inflammation in parts which have been weakened by cold. Thirdly, a part sympathises very much with the contiguous ones. If a part be weakened by having its action reduced, and if then the debilitating cause be removed, the action of the part will be increased from sympathy with the neighbouring acting parts. But, as the action ought to be very little, the power being small, inflammation must arise from the action being increased beyond the power. We ought, therefore, in this case, to diminish the action of the neighbouring parts, in order to prevent their extending their action to a part, which is not able to bear it without becoming diseased. (*Burns.*)

PROXIMATE CAUSE.

Numerous opinions have been entertained upon this subject; but, almost every theory has been built upon the supposition of there being some kind of obstruction in the inflamed part.

While the circulation of the blood was unknown, and the hypothetical notions of the power of the liver, in preparing and sending forth, this fluid, continued to prevail, it is not astonishing that the theories of physic should be exceedingly imperfect. So fully persuaded were physicians of the existence and influence of different humours and spirits, and so little did they know of the regular and constant motion of the blood, that they believed in the possibility of depositions and congestions of the blood, the bile, or lymph; and acknowledged these as the cause of inflammation. Their anatomists taught them, and their professors of physic supported the opinion, that the liver was the centre of the vascular system, from which the blood went forth by day to the extremities, and returned again by night. If then any peccant matter irritated the liver, the blood was sent out more forcibly; and if, at the same time, any part of the body were weakened, or otherwise disposed to receive a greater quantity of fluid than the rest, then a swelling was produced by the flow of humours to this place. Fluxions, or flows of humour to a place, might happen either from weakness of the part which allowed the humours to enter more abundantly, or from the place attracting the humours, in consequence of the application of heat or other agents. (*Burns.*)

The peculiar nature of the swelling thus occasioned was supposed, by the ancients, to depend upon the kind of humour. Blood produced the true phlegmon, bile, erysipelas, &c.

The ancient physicians also entertained an idea, that the blood and humours might slowly stagnate in a part, from a want of expulsive power, and this affection was termed a *congestion*, while the expression *fluxion* or *defluxion* was used to denote any swelling arising from the sudden flow of humours from a distant part. The first was formed gradually without much pain, or the feeling of pulsation, and run its course slowly; the second appeared suddenly, was very painful, had a pulsatory feel, and was rapid in its progress. The

* Those, who are curious, may see a list of remote causes in Pearson's Principles of Surgery, p. 15.

ancients, who supposed that the blood had very little motion, and that its course could be easily directed or changed, recommended bleeding from some part which was remote from a recent inflammation, by which they imagined that the current of blood was altered, and a *revulsion* made. A revulsion was also made by raising a tumour in some other part, by means of ligatures, cupping-glasses, &c. or by giving nature an opportunity of discharging the humours from distant parts, by applying leeches or blisters. Hence sinapisms were applied to the feet, in disease of the superior parts. (*Burns.*)

When blood was drawn from the vicinity of the fluxion, or congestion, the mode was called *derivation* which only differed from *revulsion* in the distance to which the humour was drawn being less. (*Burns.*)

I shall not enter further into an account of the practice of the ancients in the treatment of inflammation; but shall refer the reader to what Mr. Burns has written on the subject. Our present object is only to trace the leading doctrines, which have at different times prevailed, respecting the proximate cause of inflammation.

From the theories of *fluxion* and *congestion*, which were quite incompatible with the laws of the circulation of the blood, we turn our attention to the doctrine of *obstruction*.

Boerrhave inculcated, (*Aph.* 375 *et seq.*) that inflammation was caused by an obstruction to the free circulation of the blood in the minute vessels, and this obstruction, he supposed, might be caused by heat, diarrhœa, too copious flow of urine, and sweat, or whatever could dissipate the thinner parts of the blood, and produce a thickness or viscidity of that fluid. When the lentor did not exist before the production of inflammation, he imagined, that the larger globules of the blood, got into the small vessels, and thus plugged them up. When, for instance, the perspiration was stopped, the fluid, being retained, dilated the vessels, and allowed some of these mischievous globules to enter, and produce a more permanent obstruction. This circumstance was termed an *error loci*, and was one of the chief causes assigned for inflammation. The obstruction, whether caused by *viscidity* or an *error loci*, was imagined to occasion a resistance to the circulation in the part affected; hence increased it in the other vessels, proving an irritation to the heart, and augmenting the force or attraction of the blood in that part of the vessel which was behind the obstruction. This caused heat and pain, while the accumulation of the blood produced redness; which three symptoms are the essence of the disease. Besides *obstruction*, Boerrhave also brought into the account an *acrimonious state of the fluids*, which rendered resolution out of the question, and gangrene likely to follow. (*Aph.* 388.)

The viscidity of the blood cannot be admitted as the proximate cause of inflammation; because we have no proof, that this state ever exists; or, granting that it did, it would not explain the phenomena. Were a viscidity to occur, it would exist in the whole mass of blood, would affect every part of the body alike, and could not be supposed to produce only a local disorder. How also could such a lentor be produced by causes which bring on inflammation suddenly, without there being time for changes of the fluids to take place? (*Burns.*)

With regard to the doctrine of *error loci*, or of red globules going into vessels, which did not formerly transmit them, the fact must be admitted, at the same time, that the conclusion is denied. When the eye becomes inflamed, the tunica conjunctiva is seen with its vessels full of red blood, which in health is not the case; but this redness never appears until the inflammation has commenced, and must, therefore, be considered as an effect, not a cause. Nor can this error loci occasion any obstruction in these vessels; for, if they be divided, the blood flows freely, which shews, that they are large enough to allow an easy circulation. (*Burns.*)

Boerrhave's theory of obstruction was too circumscribed, and too mechanical; it reduced all inflammations to one species. The only distinctions which could have arisen, must have proceeded from the nature of the obstruction itself. This doctrine could never account for the action of many specific diseases and morbid poisons. (*Hunter.*)

As for the supposition of the co-operation of an *acrimony of the fluids*, the proportion of the saline matter of the blood has never been proved to be greater in this, than in any other state of the body. (*Burns.*) Even were a general disorder of this kind to be admitted, no rational explanation of the proximate cause of local inflammation could be deduced from it.

Dr. Cullen attributed the proximate cause of inflammation to a "spasm of the extreme arteries supporting an increased action in the course of them." This theory only differs from that of Boerrhave in the cause which is assigned for the obstruction. Some causes of inequality in the distribution of the blood, may throw an unusual quantity of it upon particular vessels, to which it must necessarily prove a stimulus. But, farther, it is probable, that to relieve the congestion, the vis medicatrix naturæ increases still more the action of the vessels; and which, as in all other febrile diseases, it affects, by the formation of a spasm on their extremi-

ties." "A spasm of the extreme arteries, supporting an increased action in the course of them, may, therefore, be considered as the proximate cause of inflammation; at least, in all cases not arising from direct stimuli applied; and, even in this case, the stimuli may be supposed to produce a spasm of the extreme vessels." (*Cullen.*)

The inconsistencies in Cullen's theory are very glaring. The congestion or accumulation of blood, which is only an effect or consequence of inflammation, is set down as the cause of the spasm of the vessels, to which spasmodic constrictions Cullen, strangely enough, assigns the name of proximate cause. The spasmodic contraction of the extremities of the vessels, instead of propelling the accumulated quantity of blood, would render the passage of the blood from the arterial into the venous system still more difficult. Spasmodic constriction of the small vessels is so far from being a satisfactory explanation of the proximate cause of inflammation, that even tying a large vessel does not of itself bring on the affection. Phlegmon is also attended with an effusion into the cellular substance from the extremities of the arteries; a circumstance not easily explained upon the principle of obstructed circulation. (*Burns.*)

We shall now notice the celebrated, and very original, opinions, promulgated on this subject by the famous John Hunter. According to him inflammation is to be considered only as a disturbed state of parts, which requires a new, but salutary mode of action, to restore them to that state, wherein a natural mode of action alone is necessary. From such a view of the subject, therefore, inflammation in itself, is not to be considered as a disease, but as a salutary operation, consequent either to some violence, or some disease. Elsewhere, the author remarks, the act of inflammation is to be considered as an increased action of the vessels, which, at first, consists simply in an increase or distention beyond their natural size. This increase seems to depend upon a diminution of the muscular power of the vessels, at the same time that the elastic power of the artery must be dilated in the same proportion. This is, therefore, something more than simply a common relaxation: we must suppose it an action in the parts to produce an increase of size, to answer particular purposes, and this Mr. Hunter would call an act of dilatation. The whole is to be considered as a necessary operation of nature. Owing to this dilatation, there is a greater quantity of blood circulating in the part, which is according to the common rules of the animal economy; for, whenever a part has more to do than simply to support itself, the blood is there collected in larger quantity. The swelling is produced by an extravasation of coagulable lymph, with some serum; but, this lymph differs from the common lymph, in consequence of passing through inflamed vessels. It is this lymph which becomes the uniting medium of inflamed parts; vessels shoot into it; and it has even the power of becoming vascular itself. The pain proceeds from spasm. The redness is produced either by the arteries being more dilated than the veins, or because the blood is not changed in the veins. When a part cannot be restored to health, after injury, by inflammation alone, or by adhesion, then suppuration, as a preparatory step to the formation of granulations, and the consequent restoration of the part takes place. The vessels are nearly in the same state as in inflammation; but they are more quiescent, and have acquired a new mode of action.

An increased action of the vessels is now almost universally regarded as the proximate cause of inflammation. This opinion is greatly supported from a review of the several exciting causes of the affection, which, being in general of an irritating nature, must, when applied to any living or sensible parts, occasion a preternatural exertion of the vessels. The method of cure, as we shall presently see, tends also to confirm the general doctrine with respect to the cause of inflammation.

SYMPTOMS OF PHLEGMONOUS INFLAMMATION FURTHER CONSIDERED.

The essential symptoms are redness, swelling, heat, and pain.

Redness.—This is manifestly owing to the increased quantity of blood in the inflamed part. More blood must necessarily be contained there, because the vessels, which previously conveyed this fluid, are preternaturally distended, and the small vessels, which naturally contained only lymph, are now so enlarged as to be capable of receiving red blood. Many have supposed, that the redness of common inflammation is partly occasioned by the generation of new vessels. This doctrine, however, seems very questionable. When coagulating lymph is extravasated upon the surface of a wound, an inflamed membrane, &c. I think no one can doubt, that the lymph often becomes vascular, in other words, furnished with new vessels. But, in the extravasated lymph of a phlegmonous tumour, we have no evidence shewing, that there is any generation of new vessels. Were the lymph to be rendered organized and vascular, the swelling and redness would probably be more permanent, and not admit, at least so easily, of resolution. When adhesions form between two inflamed surfaces, the or-

ganized substance, forming the connexion, lives after the subsidence of the inflammation, and is a permanent effect. It was probably the enlargement of the small vessels, which led to the theory, that new vessels are formed in inflammation. It has, however, been justly observed, that the supposition easily admits of refutation; for heat, and many other causes of inflammation, operate so quickly, that there can be no time for the formation of any new vessels; and, yet the redness is as great, and the inflammation as perfect in a minute as in an hour or a day after the application of the exciting cause. (*Burns.*) Another reason, assigned for the redness of inflammation, is that the blood, after it has become venous, retains, more or less, its bright scarlet colour. (*Hunter.*)

Swelling.—This effect arises from several causes. 1. The increased quantity of blood in the vessels. 2. The effusion of coagulating lymph, and deposition of new matter. 3. The interruption of absorption, of late particularly noticed. (*Soemmering de Morb. Vas. Absorb.*)

Pain.—This is observed to be greatest during the diastole of the arteries. The affection is probably owing to the unnatural state of the nerves, and not to mere distention, as many have asserted. Were the latter cause a real one, the pain would always be proportioned to it.

Heat.—It was formerly imagined by many, (*Boerrhave, Savage, &c.*) who wrote after the discovery of the circulation of the blood, that the heat was produced by the attraction of the red globules, against the sides of the vessels. Modern philosophy, now, however, teaches us, that a fluid may flow, with the utmost velocity, through a pipe, for a thousand years, without producing a single degree of heat. The most commonly received opinion now is, that the production of animal heat depends upon the difference in the capacity of arterial and venous blood for combining with caloric; and that in the minute arteries, the blood is combined with certain substances, in consequence of which its capacity is diminished, and heat is given out. But, when the venous blood has been freed from such substances in the lungs, its capacity is increased, and the heat, which is given out by the decomposition of the air which we inspire, is absorbed. Now, if these things be admitted as facts, the augmented heat of inflammation may be conceived to arise from the increased velocity of the circulation in the part affected. More blood is transmitted into the minute arteries; the capacity of a greater quantity of this fluid for heat is of course there necessarily diminished, and more caloric is extracted.

APPEARANCES OF THE BLOOD IN INFLAMMATION.

The blood, when taken out of the living vessels, spontaneously separates into two distinct parts, the serum and the crassamentum. The last is a compound substance, consisting chiefly of coagulating lymph, and red globules, the most heavy ingredients in the blood. Blood, taken away from persons affected with inflammation, is longer in coagulating, and coagulates more firmly, than in other instances. Hence, the red globules, not being so soon entangled in the lymph, descend, by their gravity, more deeply from its surface, which, being more or less divested of the red colouring matter, is from its appearance termed the *buffy coat*, or *inflammatory crust*. The firmer and more compact coagulation of the lymph compresses out an unusual quantity of serum from it, and the surface of the sizy blood is often formed into a hollow, the edges being drawn inward. (*Hunter.*) These changes in the blood are, in some cases, a more infallible proof of the existence of inflammation, than the state of the pulse itself. At the same time, it is probably only a criterion of some unusual operation going on in the system; for the blood taken from pregnant women is always found to exhibit the above appearances. In peritoneal inflammation, the patient sometimes seems to be in the most feeble state, and the pulse, abstractly considered, would rather induce the practitioner to employ tonics and stimulants, than evacuations; but, should the continuance or exasperation of the disorder, or any other reason, lead the surgeon to use the lancet, then the *buffy coat*, and the *concave surface* of the blood, clear away all doubt concerning the existence of inflammation.

In a few anomalous constitutions, the blood, when drawn, always exhibits the above peculiarities.

TERMINATIONS OF INFLAMMATION.

Inflammation is said to have three different terminations; or, in more correct language, we may say, that, after this process has continued a certain time, it either subsides entirely, induces a disposition in the vessels to form pus, or completely destroys the vitality of the part.

When the inflammation is to end in the first manner, which is the most favourable, the pain becomes less, the swelling subsides, the fever, and every other symptom, gradually abate, till at last the part is wholly restored to its natural size and colour. There is no formation of pus, nor any permanent injury of structure. This termination of inflammation is term-

ed by surgeons *resolution*. It is fortunately the most common, as well as the most desirable manner, in which the affection ends.

If however, notwithstanding the application of the usual remedies, the several symptoms of heat, pain, and redness, instead of diminishing, rather increase; if the febrile symptoms are likewise augmented, and the tumour gradually acquires a larger size, turns soft, somewhat prominent in the middle, or towards its most depending part; if it should next acquire a clear shining appearance, and become less painful, the different symptoms of fever being at the same time diminished, and a fluctuation perceptible in the tumour, the inflammation has ended in *suppuration*.

The worst, but, happily, the least frequent consequence of common inflammation, is the death, or *mortification*, of the part affected. The signs of this disastrous event are a change of colour in the part, which, from being of a bright red, becomes of a livid hue; small vesicles, filled with a thin fetid serum, arise on its surface, and air is plainly felt to exist in the disordered situation. The pain is, indeed, diminished; but the pulse sinks, while the tumour is gradually changed into a black, fibrous mass.

These are the three most usual terminations of inflammation. By many authors, however, another disorder has been treated of, as one in which inflammation is apt to end, viz. scirrhus. But, although that complaint may, perhaps, in a few instances, follow inflammation; yet, it is far from being a common consequence of it. Hence, although inflammatory affections may justly enough be mentioned as one of the many exciting causes of scirrhus, yet the consideration of this disorder can never with propriety, it is presumed, be introduced into an account of inflammation. (*B. Bell.*)

Common inflammation, particularly when it affects glandular parts, is often observed to leave an induration in the part. We know very well, that, when the testis has been inflamed, a hardness of the epididymis frequently remains afterwards during life. Such indurations, however, are not at all malignant, and, consequently, are very different in their nature, from what is implied by a real scirrhus.

TREATMENT OF INFLAMMATION.

Removal of the Exciting, or Remote Cause.

After the description, which we have given of inflammation, the reader may easily guess, that the grand principle to be observed in the treatment, is to endeavour to lessen that immoderate action of the arteries, which is now commonly set down as the proximate cause.

The first circumstances to be attended to in all cases, in which resolution is to be attempted, is the removal of all such exciting causes of the disorder as may happen to present themselves. If the irritation of a splinter should excite phlegmonous inflammation, who would not of his own accord extract the extraneous body?

Foreign substances in wounds frequently excite inflammation, and ought to be taken away as speedily as possible; splintered pieces of bone often give rise to the affection, and require removal; the head of a bone, being out of its place, may press and inflame the part on which it lies; and who does not immediately see the propriety of putting it back into its natural situation? Such exciting causes as these may oftentimes be detected and removed at once, and this is doing a great deal towards the cure of the inflammation. Many of the exciting causes of this affection are only of momentary application; yet, though they no longer exist, the process of inflammation must follow the violence and irritation, which were suddenly produced, and still remain. Hence, besides taking away, if possible, the remote cause, it is proper to moderate, by other means, the increased action of the vessels.

Bleeding.

If the doctrine which we have advanced be true, viz. that inflammation depends upon an increased action of the vessels, and that a greater quantity of blood is impelled into, and circulates through the inflamed part, than in the natural state; it follows that bleeding must be a principal means of relieving inflammation; because it lessens the action of the whole arterial system, and, of course, of that part which is undergoing inflammation; and because it diminishes the quantity of blood transmitted to the part affected, by lessening the whole mass in the circulation.

Bleeding, however, is often misemployed, especially, when regarded as the only remedy for inflammation, and other steps are neglected. The obstinacy and vehemence of the process in weak constitutions prove, that bleeding is not invariably proper. When inflammation is complicated with an unhealthy state of the alimentary canal, blood should be taken away with great circumspection. A great deal of induration, with little pain and heat in the inflamed part; the probability of a long and copious suppuration, as is the case in many compound fractures; and the dependence of the in-

flammation on local weakness; are particular instances, in which the practitioner should be sparing of this evacuation. Bleeding is quite unnecessary when the local inflammation and symptomatic fever are trivial, when the patient is feeble or very old, and when the cause of the affection can be entirely removed. (*Richter.*)

On the other hand, bleeding is highly beneficial in all cases, in which the inflammation is uncomplicated with a morbid state of the gastric system, is considerable in extent and degree, and attended with a good deal of febrile disturbance. The same is also strongly indicated, when the part affected is very sensible, and highly important, in regard to its office in the system. Hence, ophthalmy, or inflammation of the eye, which is a most sensible part, particularly requires a free evacuation of blood. Hence, inflammation of the lungs, brain, or stomach, which are organs, the sound state of which is intimately essential to the regular continuance of all the various operations in the animal machine, particularly demands the employment of the lancet; for, if a successful effort be not promptly made to stop such inflammation, death itself will, in all probability, be the result.

Bleeding is likewise indicated, when the patient is young, robust, and plethoric; when the cause of the disorder can neither be removed nor diminished, and when there is a very strong motive for wishing to avoid the formation of matter. Inflammation of the eye affords an instance illustrative of the truth of the last observation; for, if suppuration be allowed to take place in this organ, the common consequence is so serious a destruction of its internal structure and organization, that the future restoration of sight is totally impossible. Under such circumstances as we have specified, it is frequently necessary to repeat bleeding several times.

The efficacy of bleeding is greater, the sooner it is practised, and the more suddenly the blood is evacuated. Bleeding near the part affected is usually more effectual, than when done in a remote situation. Hence, in inflammation of the eye or brain, it is deemed most advantageous to take blood from the temporal artery.

The preceding remarks chiefly relate to *general* bleeding; for, in phlegmonous inflammation, *topical* bleeding is scarcely ever improper. It is always a point highly worthy of the surgeon's consideration, whether bleeding *in or near the part* will answer better, than taking the blood from the *general habit*; for, certainly less may be removed in this way, so as to have equal effect upon the part inflamed, and, probably, upon every other disease that is relieved by bleeding, and yet affect the constitution less. Although, in many cases, the general habit may be relieved by bleeding, yet the part affected will always require this evacuation most. That local bleeding has very considerable effects on the inflamed part, is proved by the sudden relief, which leeches, applied in cases of gout, produce. Bleeding by leeches, alone will also remove a tumour in the breast, having all the appearances of a scirrhus, which cannot be considered as inflammatory, so that topical bleeding extends its power further than the mere checking of inflammation Some part of its effect has been imputed to sympathy. (*Hunter.*) There are three modes of performing topical bleeding; by cupping; by leeches; and by dividing, or scarifying the dilated vessels leading to the inflamed part. Upon the head and face, leeches are commonly employed; upon the chest, either leeches or cupping; upon the abdomen, leeches; and upon the joints, either cupping or leeches. When the eye is inflamed, leeches may either be applied to the adjoining temple; or the dilated vessels of the conjunctiva may be scarified; or both methods may be adopted. When the inflammation extends quite to the surface of the body, leeches are always most eligible, as their bite causes less irritation in inflamed parts, than the punctures of the scarificator, or the pressure of the cupping glasses.

Purging.

The exhibition of mild laxative medicines, and saline purgatives, is a principal means of diminishing inflammation. Purging does not produce such lasting weakness as is the consequence of bleeding, and, consequently, it is scarcely ever omitted, even when taking away blood is deemed improper. Saline purges must lessen the quantity of circulating blood, inasmuch as they increase the secretion from the intestinal arteries. Hence, they must operate beneficially in the cure of local inflammation, much upon the same principle as bleeding does. Mr. Hunter was of opinion that purging lowers action, without diminishing strength, by which we are probably to understand, without producing a very lasting or permanent loss of strength. With respect to mild laxative medicines, none are superior to manna, rhubarb, oleum ricini, and the like; and of the saline purgatives, which are in general preferable to the former ones, the natron vitriolatum, kali tartarizatum, soda phosphorata, and magnesia vitriolata, are the best. We may

here remark, that besides the benefit, which the local inflammation derives from the judicious administration of purgatives, the costiveness and heat, which usually attend the symptomatic fever, are also relieved by the same means.

Nauseating Medicines.

Medicines, which have the power of producing sickness, lessen, for a time, the action, and even the general powers of life. This is in consequence of every part of the body sympathizing with the stomach; and the effect may be very quickly excited. Sickness lowers the pulse, makes the small vessels contract, and rather disposes the skin for perspiration. But nothing more than nausea should be caused: for vomiting rather rouses than depresses. (*Hunter.*) Nauseating medicines, employed after bleeding has been practised once or twice, are often productive of considerable benefit; but there are some affections, in which they cannot be used, such as inflammation of the stomach and intestines. In all superficial inflammations, however, they may be safely and advantageously exhibited, as well as in most inflammatory affections internally situated. In inflammation of the dura mater and brain, and, indeed, in every instance, in which there is an urgent reason for putting as sudden a check as possible to the continuance of the affection, the employment of nauseating doses of antimony is most strongly indicated. The antimonium tartarizatum, (emetic tartar) is the one, on which practitioners place the greatest reliance, and it is to be prescribed for the purpose of exciting nausea, as directed below.*

Opium.

The majority of surgeons entertain an insuperable objection to the administration of opiates in almost all cases of inflammation, and the aversion to this practice is for the most part deducible from the recollection of opium being a potent stimulant. The plan, however, has its advocates. (*B. Bell, Richter.*) One of its strongest partisans tells us, that opium particularly lessens the disturbance of inflammation, and it allays pain, which is at once a principal symptom of the process, and a cause of its augmentation, as well as that of the fever. Opium also quiets the inordinate action of the solids, the mental agitation, and restlessness so powerfully, that it well deserves the name of the grand *antiphlogistic remedy*. It likewise occasions a moisture on the surface of the body, which experience shews is eminently serviceable in all inflammations affecting the skin. When given with this view, it is usually conjoined with antimony, camphor, calomel, or ipecacuanha. The administration of opium is a general practice in all painful inflammations arising from external causes, and it is attended with perfect safety when evacuations from the bowels and bleeding have been previously put in practice. Care must only be taken to give it in sufficient doses; for small quantities not only fail in fulfilling the object, but frequently produce quite an opposite effect. During its employment, the bowels should be kept open by glysters. The efficacy of opium chiefly manifests itself in the early stage of the affection; for, as soon as the inflammatory fever has extended itself to the whole system, it loses its beneficial virtues. Hence, in cases of external injuries, it is to be given the two first days, immediately after bleeding. It is to be given as soon after the accident as possible, in order to tranquillize the mental alarm, and, if convenient, towards the evening, for the sake of procuring for the patient a quiet night. (*Richter.*) Evacuations being premised, says the other advocate for this medicine, the next object of importance is to procure ease and quietness to the patient, which, in cases, of inflammation, are often of more real service, than any other circumstance whatever. The most effectual remedy for this purpose is opium, which, when the pain and irritation are considerable, as very frequently happens in extensive inflammations, should never be omitted. In large wounds, especially after amputations, and other capital operations, and in punctures of all kinds, large doses of opium are always attended with remarkably good effects. In all such cases, however, opium, in order to have a proper influence, should be administered in very large doses; otherwise, instead of proving serviceable, it seems rather to have the contrary effect. This circumstance is, perhaps, the chief reason why opiates in general have been very unjustly condemned in every case of inflammation. (*B. Bell.*)

On the contrary, they who are averse to the use of opium, remark, that, in acute inflammation, daily experience shews, independently of every theory, that the exhibition of this medicine increases the general fever, and aggravates the local action. Even given as a preventive of inflammation, after operations, anodynes are almost uniformly hurtful, producing restlessness, heat, thirst, and afterwards head-ach, sickness, and frequently, troublesome vomiting. (*Burns.*)

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* ℞. Antimonii tartarisati grana duo; Aquæ distillatæ uncias quatuor. Misce et cola. Dosis, Uncia dimidia sextâ quâque horâ.

Upon the whole, candour obliges me to own, that the votes of the majority of surgeons in this country are decidedly against the general use of opium in inflammation; but, after the performance of severe operations, and in all instances, attended with excessive pain, truth, I believe, will justify my saying, that the voice of most practitioners is in favour of the exhibition of this remedy.

DIET AND REGIMEN.

In all cases, the surgeon is to forbid taking wine and spirits; and, when the inflammation is in the least considerable, the same prohibition is to be made in regard to animal food. Watery, cooling, mucilaginous drinks, taken in a lukewarm state, are proper; for they keep off thirst and heat, and tend to sooth the increased action of the whole arterial system. For this purpose, whey, buttermilk, barley-water, decoction of dried fruits, water-gruel, &c. are the best.

The chamber, in which the patient lies, should not be kept warmer, than his comfort requires; for, of all things, heat keeps up any increased action in the body, in the most powerful manner. For the same reason, the patient should not be covered with a superfluous quantity of bed-clothes.

The whole body, but more especially the inflamed part, should be preserved as free as possible from every kind of motion. Every one knows, that all motion, exercise, and muscular exertion, accelerate the circulation, and hence they must have a pernicious effect on inflammation, by determining a larger quantity of blood to the part affected.

TOPICAL APPLICATIONS—COLD ONES.

With the exception of what has been stated, concerning topical bleeding, all the foregoing remarks relate to the *general* treatment of inflammation: we shall next consider the *local*.

It has been already observed, that phlegmon is attended with an increase of heat in the part affected, and it is an acknowledged and well known fact, that the action of the arteries, as well as every other operation in the animal economy, is promoted and increased by the influence of heat. For this reason an obvious indication arises, viz. to reduce the temperature of the inflamed part, by the topical application of cold, and, in particular, by continually abstracting the heat generated in the part, by keeping up a constant evaporation from its surface.

Preparations of lead, and other sedative and astringent substances, are such as are in the greatest repute for bringing about the resolution of inflammation.

I am decidedly averse to entering into minute discussions, concerning the *modus operandi* of such medicines as are recommended. These disquisitions would only extend our remarks to an unnecessary length, and probably fail in conveying satisfactory information to the reader. However, I am firmly of the same sentiment with a preceding systematic writer (*B. Bell*) that, in some circumstances, it may not be improper to deviate so far from the general plan, as to render, as obvious as possible, the propriety of what at any time may be advanced; for mere practical assertions, unsupported by some foundation in reason, can never prove either so useful or agreeable as they might otherwise be rendered.

We have remarked, that the cold applications, used in the resolution of inflammation, are commonly such as are of an astringent and sedative quality. But the whole class of medicines, which are found to possess these properties, can never be recommended as topical remedies for phlegmonous inflammation. Opium is one of the most powerful of all sedatives; yet, when applied to the surface of the human body, (if the cuticle intervene,) it has little virtue; and, if the part be excoriated, it is always productive of some degree of irritation. Hence, however useful opium may be as a topical application to some particular species of inflammatory affections, which will be specified in the course of this work, we may certainly conclude, that it will never come into general use, as an external local application in inflammatory cases. Similar objections might, perhaps, be made to the employment of nearly all sedatives, in cases of acute inflammation. The zincum vitriolatum, cerussa acetata (*sugar or acetite of lead*), and vinegar, are the only medicines of the astringent and sedative class, which seem to have acquired permanent celebrity for their efficacy in resolving inflammation.

Extensive experience, and long established trials, have now fully confirmed the virtue of all those local remedies, in which the acetite of lead is the active ingredient. M. Goulard, and numerous other French surgeons, found, that the objections to the employment of many other sedative applications in the treatment of inflammation, did not exist against the use of the preparation of lead. The universal assent of modern practitioners proves, indeed, that the acetite of lead, as a local application for genuine phlegmonous inflammation, is certainly unsurpassed, if not unrivalled, in point of efficacy.

Although M. Goulard, in extolling a

favourite remedy, has been induced to assert its effects to be more general and considerable than they probably will ever be found to be; yet the world is much indebted to him; not, however, for a *new* medicine, as every preparation of lead, recommended by him, was formerly, in some form or other, known to every practitioner; but, for introducing into *more general use* a very effectual remedy for the discussion of inflammatory swellings. (*B. Bell.*)

The preparations of lead certainly merit the appellation of sedatives. When taken internally, many of the most striking effects of this mineral are of a sedative kind. The propriety of the term, however, is more particularly evinced by the immediate and obvious operation of lead, when any of its preparations are outwardly applied to the surface of an inflamed part. An abatement of the different symptoms of pain, and tension, and the communication of an agreeable soothing sensation to the part, are almost always its direct palpable effects.

The preparations of lead are recommended by M. Goulard, as almost equally applicable to every stage of inflammation. When swellings have fully suppurated, the employment of, what he calls, the *extractum Saturni*, will almost always render it unnecessary to open them. Even in gangrene, the solution of lead is represented by this zealous writer, as a remedy deserving of the greatest confidence.

But, notwithstanding, the above exaggeration, every man of experience and observation will allow, that, while there is a chance of accomplishing resolution, no local applications to phlegmonous inflammation, are in general so proper, as cold lotions, containing the acetite of lead.

From the poisonous qualities of lead, when taken into the system, and from the possibility of this mineral being absorbed from the surface of the body, objections have arisen against the free use of its preparations, even as outward remedies in cases of inflammation. Certain it is, however, that though the possibility of such absorption is proved by the occurrence of the disorder called the *colica pictonum*, which originates in painters from the white lead absorbed into the system, yet, any ill effects from the use of lead, as an application to inflamed parts, are so exceedingly rare, that they can hardly form a serious objection to the practice. It is a fact, that, in inflamed parts, there is an impediment to absorption, and this circumstance may tend to render the employment of lead a matter of safety. Mr. B. Bell observes, that in all the experience he has had, of the external application of lead and its preparations, and in many cases, particularly of burns, he has known the greatest part of the surface of the body covered with them for days, nay, for weeks together, he does not recollect a single instance of any disagreeable symptom being ever produced by them.

A lotion composed of cerussa acetata (sugar of lead), vinegar and water, is one very commonly employed*. Occasionally, bread-crumb is moistened in the fluid, and applied to the part affected, in the form of a poultice; but, linen wet in the lotion, and kept constantly so, is now almost always preferred. Thus a continual evaporation is maintained, and of course a continual abstraction of heat.

The aqua lithargyri acetati is preferred by most surgeons.

About a tea-spoonful of this preparation, mixed with a pint of water, makes a very proper lotion for all ordinary cases.

When the surgeon is afraid to employ a solution of lead, he may try one containing the zincum vitriolatum. For this purpose one dram of this metallic salt is to be dissolved in a pint of water, and linen, well wet with the lotion, is to be applied to the inflamed part.

Many practitioners impute very little real efficacy either to the acetite of lead, or sulphate of zinc, contained in the above applications; and, they attribute all the good, that is produced, entirely to the evaporation kept up from the surface of the inflamed part, and to the coldness of the fluid, in which the metallic salts are dissolved. Those, who entertain these sentiments, think the application of cold water alone quite as efficacious, as that of any medicated lotion whatsoever.

There are particular cases of inflammation, in which the extravasation of blood and lymph, into the interstices of the inflamed part, is exceedingly copious, while the swelling is considerable, and the pain and redness not particularly great. In such instances, it is a grand indication to rouse the action of the absorbents, in order to remove the extravasated fluid, and with this view, a more powerful discutient lotion, than the saturnine one, should be employed. Sometimes, it is better to use embrocations and liniments, than any sort of lotion. A very excellent discutient lotion is one of those mentioned below.†

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* ℞. Cerussæ Acetatæ ℥ss.
Solve in Acet. pur. ℥iv.
Et adde Aq. Fontanæ distill. ℔ij.
The vinegar makes the solution more complete.

† ℞. Ammoniæ Muriatæ ℥ss.
Aceti;

When the part affected with inflammation is not very tender, or when it lies deep, applications of the vegetable acid are often had recourse to with considerable advantage; and the most effectual form of using it seems to be a poultice made with vinegar and crumb of bread. In such cases, it has been thought, that an alternate use of this remedy, and the saturnine lotion, has produced more beneficial effects, than are commonly observed from a continued use of one of them. (*B. Bell.*) However, surgeons of the present day seem to think, that vinegar can be as advantageously applied in the form of a lotion, as in that of a poultice, and, certainly, with less trouble.

Alcohol and æther have acquired some celebrity, as local remedies for inflammation. Perhaps, one great reason, why they are not more extensively used in this way, is the expence attending such treatment, as these fluids evaporate with great rapidity. Alcohol may possibly prove useful from its astringent qualities; but, it seems much more rational to impute both its virtue, and that of æther, to the powerful manner, in which the evaporation of such fluids deprives the inflamed part of its heat.

WARM APPLICATIONS, EMOLLIENT POULTICES AND FOMENTATIONS.

The absurdity of attempting to reconcile every useful practice with a philosophical theory, is, in no instance, more strikingly shewn, than in the opposite sorts of local applications, which are of service in inflammation. The generality of cases undoubtedly receive most relief from the use of cold sedative astringent lotions: but, there are constitutions and parts, which derive most service from the local employment of warm emollient remedies.

Were I to endeavour to define the particular instances, in which the latter applications avail most, I should take upon me a task, which has baffled all the most able surgical writers. The first stage of the acute ophthalmy, and the hernia humoralis, or inflamed testicle, may be specified, however, as examples, in which, generally speaking, warm emollient applications are better, than cold astringent ones. If we may judge by the feelings of certain patients, there are undoubtedly particular constitutions, in which the local use of warm remedies, produces greater relief, than that of cold ones. This circumstance, however, does not generally happen; and, as warm emollient applications of all kinds have the most powerful influence in promoting suppuration, a fact admitted by every experienced practitioner, the use of such remedies, while the resolution of inflammation is practicable, must be highly censurable. But, I am ready to grant, that in all cases of inflammation, which manifestly cannot be cured without suppuration, the emollient plan of treatment ought to be at once adopted; for, the sooner the matter is formed, the sooner the inflammation itself is stopped. The inflammation attending contused and gun-shot wounds, and that accompanying boils and carbuncles, are of this description. The inflammation, originating in fevers, commonly ends in suppuration, and, perhaps, it might be advantageous, in such instances, also, to employ at once the emollient treatment.

Warmth and moisture together, in other words, fomentations, are commonly had recourse to in cases of inflammation; but, when the warmth is as much as the sensitive principle can bear, it excites action. Whether it is the action of inflammation, or the action of the contraction of the vessels, is unknown. We see that many patients cannot bear warmth, and, therefore, it might be supposed to increase the action of dilatation, and do harm. But, if the pain should arise from the contraction of the inflamed vessels, benefit would be the result; though we must doubt that this change is produced, as making the vessels contract would probably give ease. (*Hunter.*)

From the preceding observations, we must perceive how vain it is to theorize on this subject, which even puzzled the genius and penetration of a Hunter. In addition to what has been already observed, I feel totally incapable of giving any useful practical advice, with respect to those cases, in which warm emollient applications should be used in preference to cold astringent ones. I can, however, with confidence remark, that the surgeon, who consults the feelings and comfort of the patient on this point, will seldom commit any serious error. Hence, in all cases, in which the first kind of topical applications seem not to produce the wonted degree of relief, let the second sort be tried. From the opportunity of comparison, a right judgment may then be easily formed.

The poultice made of the powder of linseed is so easily prepared, that the old bread and milk poultice is now seldom made. As much hot water is to be put into a basin, as the size of the poultice re-

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Spiritûs Vini rectificati; sing. ℔j. M.

℞. Aq. Ammon. Acet.
Spir. Vini rectif.;
Aq. Distillatæ; sing. ℥iv. M.

The Aqua Ammoniæ Acet. alone also does very well.

quires, and then the linseed powder is to be gradually mixed with the water, till the mass is of a proper consistence. Very frequently, a little sweet oil is also added to keep the application longer soft and moist.

Fomentations are only to be considered as temporary applications, while the emollient poultices are the permanent ones. The former are, at most, never used more than three times a day, for the space of about half an hour each time. Two of the best are directed below*.

By pursuing the treatment, recommended above, the resolution of the inflammation will in general begin to take place, either in the course of three or four days, or in a shorter space of time. At all events, it may usually be known before the expiration of this period, how the disorder will terminate. If the heat, pain, and other attending symptoms abate; and, especially, if the tumour begins to decrease, without the occurrence of any gangrenous appearances; we may then be almost certain, that, by a continuance of the same plan, a total resolution will in time be effected.

On the other hand, when all the different symptoms increase, and, particularly when the tumour becomes larger, and softish, attended with a more violent throbbing pain, we may conclude, that the case will proceed to suppuration. Hence, an immediate change of treatment is indicated, and such applications, as were proper, while resolution seemed practicable, are to be left off, and others substituted. This remark relates to the employment of cold astringent remedies, which, when suppuration is inevitable, only do harm, by retarding what cannot be avoided, and affording no relief of the pain and other symptoms. If the inflammation, however, should already be treated with emollients, no alteration of the topical applications is requisite, in consequence of the inevitability of the formation of matter. Indeed, emollient poultices, and fomentations, are the chief local means both of promoting suppuration, and diminishing the pain, violent throbbing, &c. which always precede this termination of phlegmonous inflammation.

But, besides the substitution of warm emollient applications for cold astringent ones, to the part itself, practitioners have decided, that it is also prudent, as soon as the certainty is manifest, to relinquish the free employment of evacuations, particularly, blood-letting, and to allow the patient a more generous diet. When the system is too much reduced by the injudicious continuance of the rigorous antiphlogistic treatment, the progress of the ensuing suppuration is always retarded in a disadvantageous manner, and the patient is rendered too weak to support, either a long continued, or a profuse discharge, which, it may not be possible to avoid.

On the subject of inflammation, the best works for perusal are; *Van Swieten's Commentaries on Boerhaave*; *Cullen's First Lines on the Practice of Physic*, *Vol.* I; *John Hunter on Inflammation, &c.*; *Burns's Dissertations on the same.*

INGUINAL ANEURISMS. *See Aneurism.*

INGUINAL HERNIA. *See Hernia.*

INJECTION, (from *injicio*, to cast into.) A fluid, intended to be thrown into a part of the body by means of a syringe. Thus port wine and water form an injection, which is used by surgeons for radically curing the hydrocele, and, for this purpose, it is introduced into the cavity of the tunica vaginalis, where it excites the degree of inflammation necessary to produce an universal adhesion between this membrane and the albuginea.

Thus many fluid remedies are introduced into the urethra and vagina for curing the gonorrhœa. In the article *Gonorrhœa*, will be found an account of the best injections employed for its relief. We here subjoin a few particular ones not there noticed.

INJECTIO ACIDI MURIATICI.—℞. Aquæ distil. ℥iv. Acid. Mur. gutt. viij. Misce.—Useful when the scalding is a very troublesome symptom.

INJECTIO ALUMINIS.—℞. Alum. ʒj. Aq. pur. ℥vj. Misce.—Successfully employed by Dr. Cheston, as an injection in affections of the rectum, either when the internal coat is simply relaxed, and disposed to prolapsus, or when it is studded with loose fungated tumours. In such cases, camphor is also of service. The quantity of alum may be increased, if the parts will bear it.

INJECTIO CUPRI AMMONIATI.—℞. Liquoris Cupri ammon. gutt. xx. Aquæ rosæ ℥iv. Misce.—Strongly recommended by Mr. Foot.

INJECTIO QUERCUS.—℞. Decocti quercûs ℔j. Aluminis purificati ℥ss. Misce.—May be used, when the rectum, or vagina, is disposed to a prolapsus from relaxation, or in cases of gleet.

INTERRUPTED SUTURES. See *Sutures.*

INTESTINES WOUNDED. See *Abdomen, Wounds of.*

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* ℞. Lini contusi ℥j.
Chamæmeli ℥ij.
Aq. Distill. ℔vj. Paulisper coque et cola.

or ℞. Papaveris albi exsiccati ℥iv.
Aq. Puræ ℔vj. Coque usque remaneant ℔ij. et cola.

INTROSUSCEPTION, or *Intussusception*, (from *intus*, within, and *suscipio*, to receive.) Called also *Volvulus*. Is a disease, produced by the passing of one portion of an intestine into another, and it is commonly from the upper passing into the lower part. (*J. Hunter.*)

Mr. G. Langstaff has published an interesting paper, on this subject, in the *Edinb. Surg. Journal, No. XI.*; which I shall take the liberty of freely quoting.

This gentleman remarks, that the small intestines of children are so often affected with introsusception, in a slight degree, that most practitioners must have had opportunities of observing the form of the complaint. The greatest part of three hundred children, who died either of worms, or during dentition, at the Hospital de la Saltpetriere, and came under the examination of M. Louis, had two, three, four, and even more volvuli, without any inflammation of the parts, or any circumstances leading to a suspicion, that these affections had been injurious during life. "These cases (says M. Louis) seem to prove, that introsusception may be formed, and destroyed again by the mere action of the intestines." (*Mem. de l'Acad. de Chirurg. 4to. tom. 4. p. 222.*) This opinion is confirmed by the authority of Dr. Baillie, (*Morbid Anatomy, 2d edit. p. 162.*) who observes, that, "in opening bodies, particularly of infants, an intussusceptio is not unfrequently found, which had been attended with no mischief; the parts appear perfectly free from inflammation, and they would probably have been easily disentangled from each other by their natural peristaltic motion."

The disease, continues Mr. Langstaff, assumes a more dangerous, and, indeed, generally a fatal form, when it occurs at the termination of the small intestines in the cœcum. A contracted state of the part to be introsuscepted, and a dilatation of that portion of the canal, into which this part must pass, are essential conditions to the formation of a volvulus; and those exist no where so completely as in the situation here alluded to. The extent, to which the affection proceeds in this situation, would appear almost incredible, if it were not proved by well authenticated facts. A person, who considered the natural situation and connexion of the parts, would of course require the strongest evidence, before he would believe, that the ilium, cœcum, ascending, and transverse portions of the colon, may descend into the sigmoid flexure of the latter intestine; nay more, that they may pass through the rectum, and be protruded in the form of a procidentia ani. Such cases, however, are recorded. (*Langstaff in Edinb. Med. and Surg. Journal, No. XI.*)

This gentleman next relates the case of a child three months old, the body of which he inspected after death, and found to confirm the truth of the preceding account. The example was particular in there being in addition to an extensive introsusception in the usual way, a smaller invagination in the opposite direction, like what probably occurred in the case related by Mr. Spry; *Med. and Physical Journal, No. XI.* Mr. Home, in the *Med. and Chirurg. Trans. Vol. 1.* mentions an example of a retrograde introsusception, in which a worm was found coiled up round the introsuscepted part. The disease took place in a boy who had swallowed some arsenic.

If the following mode of accounting for introsusception, be just, it will most frequently happen downwards, although there is no reason why it may not take place in a contrary direction; in which case, the chance of a cure will be increased by the natural actions of the intestinal canal tending to replace the intestine; and probably from this circumstance it may oftener occur than commonly appears. (*J. Hunter.*)

When the introsusception is downwards, it may be called *progressive*, and when it happens upwards, *retrograde*. The manner in which it may take place is, by one portion of a loose intestine being contracted, and the part immediately below relaxed and dilated; under which circumstances, it might very readily happen by the contracted portion slipping a little way into that which is dilated, not from any action in either portion of intestine, but from some additional weight in the gut above. How far the peristaltic motion, by pushing the contents on to the contracted parts, may force these into the relaxed, Mr. Hunter will not determine, but is inclined to suppose that it will not. (*J. Hunter.*)

By this mode of accounting for an accidental introsusception, it may take place either upwards or downwards; but if a continuance or an increase of it arises from the action of the intestines, it must be when it is downwards, as we actually find to be the case; yet this does not explain those in which a considerable portion of intestine appears to have been carried into the gut below: to understand these, we must consider the different parts which form the introsusception. It is made up of three folds of intestine; the inner, which passes down, and being reflected upwards, forms the second or inverted portion, which being reflected down again, makes the third or containing part, that is the outermost, which is always in the natural position. (*J. Hunter.*)

The outward fold is the only one which is active, the inverted portion being perfectly passive, and squeezed down by the

outer, which inverts more of itself, so that the angle of inversion in this case is always at the angle of reflection of the outer into the middle portion or inverted one, while the innermost is drawn in. From this we can readily see how an introsusception, once begun, may have any length of gut drawn in. (*J. Hunter.*)

The external portion acting upon the other folds in the same way as upon any extraneous matter, will by its peristaltic motion urge them further; and, if any extraneous substance is detained in the cavity of the inner portion, that part will become a fixed point for the outer or containing intestine to act upon. Thus it will be squeezed on, till at last the mesentery preventing more of the innermost part from being drawn in, will act as a kind of stay, yet without entirely hindering the inverted outer fold from going still further. For it being the middle fold that is acted upon by the outer, and this action continuing after the inner portion becomes fixed, the gut is thrown into folds upon itself; so that a foot in length of intestine shall form an introsusception not more than three inches long. (*J. Hunter.*)

The outer portion of intestine is alone active in augmenting the disease when once begun; but if the inner one were capable of equal action in its natural direction, the effect would be the same, that of endeavouring to invert itself, as in a prolapsus ani; the outer and inner portions, by their action, would tend to draw in more of the gut, while the intermediate part only would, by its action, have a contrary tendency. (*J. Hunter.*)

The action of the abdominal muscles cannot assist in either forming, or continuing this disease, as it must compress equally both above and below, although it is capable of producing the prolapsus ani. (*J. Hunter.*)

When an introsusception begins at the valve of the colon, and inverts that intestine, we find the ilium is not at all affected; which proves that the mesentery, by acting as a stay, prevents its inversion. (*J. Hunter.*)

From the natural attachment of the mesentery to the intestines, one would, at the first view of the subject, conceive it impossible for any one portion of gut to get far within another; as the greater extent of mesentery that is carried in along with it would render its further entrance more and more difficult, and we should expect this difficulty to be greater in the large intestines than in the small, as being more closely confined to their situation; yet one of the largest introsusceptions of any known was in the colon, as related by Mr. Whateley. (*Vid. Phil. Trans. Vol. 76. p. 305.*)

The introsusception appeared to have begun at the insertion of the ilium into the colon, and to have carried in the cœcum with its appendix. The ilium passed on into the colon, till the whole of the ascending colon, the transverse arch, and descending colon, were carried into the sigmoid flexure and rectum. The valve of the colon being the leading part, it at last got as low as the anus; and when the person went to stool he only emptied the ilium, for one half of the large intestines being filled up by the other, the ilium alone, which passed through the centre, discharged its contents. (*J. Hunter.*)

Two questions of considerable importance present themselves to the mind in considering this subject; whether there are any symptoms, by which the existence of the affection can be ascertained during life? And whether we possess any means of relieving it, supposing, that its existence could be discovered? The symptoms attending an introsusception, are common to inflammation of the intestines, hernia, and obstruction of the canal, from whatever cause, and a volvulus is the least frequent cause of such symptoms. (*Langstaff.*) In the case, published by this gentleman, and in those related by Mr. Hunter and Mr. Spry, the seat of the disease was clearly denoted by a hard tumour on the left side of the abdomen. This circumstance, together with the impossibility of throwing up more than a very small quantity of fluid in clysters, (*Hevin, Spry, Langstaff,*) and the presence of the other symptoms, would lead us to suspect the nature of the disorder. If the invaginated portion descended so low as to protrude through the anus, and we could ascertain, that it was not an inversion of the gut, the cause might be considered as clear, and we should have no hesitation in delivering a prognosis, which, by preparing the friends for the fatal termination, would exonerate us from all blame on its occurrence. (*Langstaff.*)

In the treatment of this disease, bleeding, to lessen the inflammation that might be brought on, and quicksilver to remove the cause, have been recommended.

Quicksilver would have little effect either in one way or the other, if the introsusception were downward; for it is to be supposed that it would easily make its way through the innermost contained gut, and, if it should be stopped in its passage, it would, by increasing its size, become a cause (as before observed) of assisting the disease. In cases of the retrograde kind, quicksilver, assisted by the peristaltic motion, might be expected to press the introsusception back; but even under such circumstances it might get between the containing and inverted gut into the angle of reflection, and, by push-

ing it further on, increase the disease it is intended to cure. (*J. Hunter.*)

Every thing that can increase the action of the intestine downwards is to be particularly avoided, as tending to increase the peristaltic motion of the outer containing gut, and thus to continue the disease. Medicines can never come in contact with the outer fold, and, having passed the inner, can only act on the outer below, therefore cannot immediately affect that portion of the outer which contains the introsusception; but we must suppose that whatever affects, or comes in contact with the larger portion of the canal, so as to throw it into action, will also affect by sympathy any part that may escape such application. Mr. Hunter therefore advises giving vomits, with a view to invert the peristaltic motion of the containing gut, which will have a tendency to bring the intestines into their natural situation.

If this practice should not succeed, it might be proper to consider it as a retrograde introsusception, and by administering purges endeavour to increase the peristaltic motion downwards. (*J. Hunter.*)

I cannot agree with Mr. Langstaff, that it is to be regretted, Hunter's name should be affixed to the preceding proposal, or that it is an absurd one; for purgatives and emetics were only recommended to increase the peristaltic action, the former downward, the latter upward, according as the supposed nature of the case might require, and this effect they certainly would have, notwithstanding vomiting is an early and constant symptom of the disease, and an insuperable constipation an equally invariable attendant. The method, I allow, however, is not very hopeful, on account of the existence of adhesions. Mr. Langstaff remarks, that the *Recherches Historiques sur la Gastrotomie dans le cas de Volvulus, par M. Hevin*, (*Mem. de l'Acad. de Chirurgie, Tom.* 4, 4*to.*) contain many interesting facts and much sound reasoning. There we find a very ample discussion of the question, concerning the propriety of opening the abdomen, in order to disentangle the introsuscepted intestine; a proposal which M. Hevin condemns.

If the equivocal and uncertain nature of the symptoms of volvulus, were not sufficient to deter us from undertaking an operation, which, under the most favourable circumstances, could not fail to be extremely difficult, and imminently hazardous to the patient, the state of the invaginated parts will entirely banish all thoughts of such an imprudent attempt. The different folds of the intestine become agglutinated to each other, so that they can hardly be withdrawn after death; (*Simpson, Edinburgh Med. Essays, Vol.* 6. *Hevin's* 4*th Obs. Malcolm, Physical and Lit. Essays, Vol.* 2, *p.* 360. *Hunter, Med. and Chir. Trans. and Soemmering in Trans. of Baillie's Morb. Anat.*) the stricture on the introsuscepted part causes it to inflame, and even mortify. (*Soemmering.*) It is very clear, that, in this state of parts, the operation of gastrotomy would be totally inadmissible, even if the symptoms could clearly indicate the nature of the case, and the affected part could be easily reached and examined. (*Langstaff, in Edinburgh Medical and Surgical Journal.*)

The forcible injection of clysters was found useless by Dr. Monro, and the agglutination of the parts must produce an insuperable obstacle to the bowels being pushed back by this means. (*Langstaff.*) Some have proposed the employment of a long bougie, or a piece of whalebone, to push back the intestine; and this proposal may be adopted, when we are furnished with an instrument, adapted to follow the windings of the large intestine to its origin in the right ilium, without any risk of perforating the gut in its course. (*Langstaff.*)

We must confess, both surgery and medicine are almost totally unavailing in the present disease. Yet here, as in many other instances, the resources of nature are exhibited in a most wonderful and astonishing manner, while those of art completely fail. The invaginated portion of intestine sometimes sloughs, and is discharged *per anum*, while the agglutination of the parts preserves the continuity of the intestinal canal. The annals of medicine furnish numerous instances, in which long pieces of gut have been discharged in this manner, and the patient has recovered. Hence, some hope may be allowed under the most unpromising circumstances. In a case, related in Duncan's Commentaries, eighteen inches of small intestine were voided *per anum*, Vol. 9, p. 278. Three similar instances occur in M. Hevin's Memoir; twenty-three inches of colon came away in one of these, and twenty-eight of small intestines in another. Other cases occur in the Physical and Literary Essays, Vol. 2, p. 361; in Duncan's Annals, Vol. 6, p. 298; in the Medical and Chirurgical Transactions, Vol. 2; where Dr. Baillie states, that a yard of intestine was voided. The patients did not, however, ultimately survive in every one of these instances. (*Langstaff, in Edinb. Med. and Surgical Journal.*)

For information concerning intussusceptio, I would particularly refer the reader to *M. Hevin in Mem. de l'Acad. de Chir. Hunter's Observations, in the Medical and Chirurgical Transactions. L'En-*

Cyclopédie Méthodique, Partie Chirurgicale; *Art. Gastrotomie. And Langstaff's Remarks in the Edinburgh Med. and Surgical Journal, No. II.*

INVERSION OF THE UTERUS. See *Uterus, Inversion of.*

IRIS, PROLAPSUS OF. As long as the humours, which fill the cavity of the eye, and in which the iris is immersed and suspended, remain in perfect equilibrium with respect to each other, that membrane retains its natural position, and a suitable distance from the cornea. While such an equilibrium continues, the iris, although of a very delicate and yielding texture, contracts, and relaxes itself, without ever forming any irregular fold. But, when the aqueous humour has escaped through an accidental, or artificial, opening in the cornea, the iris is pressed forward by the humours situated behind it, and is urged gradually towards the cornea, until a portion of it protrudes from the eye, at the same opening, through which the aqueous humour made its escape. Thus a small tumour of the same colour as the iris forms on the cornea, and is named, by the majority of surgeons, *staphyloma* of the iris; but, for the sake of distinguishing the disease more particularly from another, to which the term, *staphyloma* is more properly applicable, Scarpa prefers calling it, with Galen, *procidentia*, or *prolapsus of the iris.*

The causes of this complaint are such wounds and ulcers of the cornea, as make an opening of a certain extent into the anteriour chamber of the aqueous humour, and such violent contusions of the eye-ball, as occasion a rupture of the cornea. If the edges of a wound in this situation, whether accidental, made for the purpose of extracting the cataract, or evacuating the matter of an hypopium (as is the practice of some), be not brought immediately afterwards into reciprocal contact, or continue not sufficiently agglutinated together to prevent the escape of the aqueous humour from the anteriour chamber, regularly as this fluid is reproduced; the iris, drawn by its continual flux towards the cornea, glides between the lips of the wound, becomes elongated, and a portion of it gradually protrudes, beyond the cornea, in the form of a small tumour. The same thing takes place, whenever the eye-ball unfortunately receives a blow, or is too much compressed by bandages, during the existence of a recent wound of the cornea. Also, if the patient should be affected, in this circumstance, with a spasm of the muscles of the eye, with violent and repeated vomiting, or with strong and frequent coughing, a prolapsus of the iris may be caused. When an ulcer of the cornea penetrates the anteriour chamber of the aqueous humour, the same inconvenience happens more frequently, than when there is a recent wound of that membrane; for, the solution of continuity in the cornea, arising from an ulcer, is attended with loss of substance, and in a membrane so tense, and compact, as this is, the edges of an ulcer do not admit of being brought into mutual contact.

The little tumour is likewise necessarily of the same colour as the iris, viz. brown, or greyish, being surrounded at its base by an opaque circle of the cornea, on which membrane there is an ulcer, or a wound of not a very recent description.

As it usually happens, that the cornea is only penetrated at one part of its circumference by a wound, or ulcer, so in practice we commonly meet with only one prolapsus of the iris in the same eye. But, if the cornea should happen to be wounded, or ulcerated, at several distinct points, the iris may protrude at several different places of the same eye, forming an equal number of small projecting tumours on the surface of the cornea. Scarpa has seen a patient, who had three very distinct protrusions of the iris on the same cornea, in consequence of three separate ulcers, penetrating the anteriour chamber of the aqueous humour; one in the upper, and two in the lower segment of the cornea.

If we reflect a little on the delicate structure of the iris; the great quantity of blood-vessels, which enter it; and the numerous nervous filaments, which proceed to be distributed to it, as a common centre; we shall easily conceive the nature, and severity of those symptoms, which are wont to attend this disease, how small soever the portion of the iris projecting from the cornea may be, even if no larger than a fly's head. The hard and continual frictions, to which this delicate membrane is then exposed, in consequence of the motions of the eyelids; together with the access of air, tears and gum to it; are causes quite adequate to the production of continual irritation; and the blood, which tends to the point of the greatest irritation, cannot fail to render the projecting portion of the iris much larger, almost directly after its protrusion, than it was at the moment of its first passing through the cornea. Hence, it becomes, soon after the prolapsus, more incarcerated and irritated, than it was at first. In the incipient state of the complaint, the patient complains of a pain, similar to what would arise from a pin penetrating the eye; next he begins to experience, at the same time, an oppressive sensation of a tightness, or constriction, over the whole eye-ball. Inflammation of the conjunctiva, and eyelids, a

burning effusion of tears, and an absolute inability to endure the light, successively take place. As the protruded portion of the iris drags after it all the rest of this membrane, the pupil assumes of mechanical necessity an oval shape, and deviates from the centre of the iris, towards the seat of the prolapsus. The intensity of the pain, produced by the inflammation, and other symptoms, attendant on the prolapsus of the iris, does not, however, always continue to increase.

Indeed, in practice, cases of old protrusions of the iris often occur, where, after the disease has been left to itself, the pain and inflammation spontaneously subside, and the tumour of the iris becomes almost completely insensible. Scarpa mentions his having seen a man, fifty years of age, who had had a prolapsus of the iris in the right eye ten weeks; it was as large as two grains of millet seed; the patient bore it with the greatest indifference, and without any other inconvenience, than a little chronic redness of the conjunctiva, and a difficulty of moving the eye-ball freely, in consequence of the friction of the lower eyelid against the tumour formed by the iris. When the extremity of the finger was applied, the little tumour seemed hard and callous to the touch.

This phenomenon was partly owing to the constriction, which the base of the tumour of the iris suffered between the lips of the wound, or ulcer of the cornea. The protruded portion of the iris loses its natural exquisite sensibility, in consequence of such compression, or stranguiation. The phenomenon was also partly ascribable to the iris being deprived of its vitality by the induration, and callosity, which were occasioned by the long exposure of this membrane to the air, and tears.

In the early stage of this disease, some direct the iris to be replaced in its proper situation by means of a whalebone-probe; and, in case of difficulty, to make a dilatation of the wound, or ulcer, of the cornea, by an incision, proportioned to the exigency of the case, as we are accustomed to do, in order to return a strangulated intestinal hernia. Others only recommend stimulating the prolapsed portion of the iris, with a view of making it contract and shrink into the eye; or suddenly exposing the eye affected to a very vivid light, in the belief, that, as the pupil then forcibly contracts, the piece of the iris, engaged between the lips of the wound, or ulcer of the cornea, will rise to its proper place. However, Scarpa strongly contends that all such methods are absolutely useless, and even dangerous. Supposing it were possible, by such attempts, to reduce the iris to its proper situation, without tearing, or injuring it in any manner whatever, still the aqueous humour would escape as before, through the wound, or ulcer of the cornea, so that the iris, when replaced, would fall down, the moment afterwards, and project from the cornea, in the same way as before the operation.

It cannot be denied, that the prolapsus of the iris is an afflicting accident: but, when it is remembered, that surgery has no means of suppressing at once, or, at least, of suspending the escape of the aqueous humour through a wound, much less through an ulcer of the cornea, when either exceeds certain limits, the prolapsus of the iris, far from being an evil in such unfavourable circumstances, will be found rather useful, and, perhaps, the only means of preventing the total loss of the organ of sight; for, the flap of the iris insinuates itself, like a plug, between the edges of the wound, or ulcer of the cornea, and thus completely prevents the exit of the aqueous humour.

In consequence of this fluid being quickly regenerated, and unable to escape any longer through the cornea; it prevents the further protrusion of the iris, removes the rest of this membrane to a greater distance from the cornea, and, by re-establishing the equilibrium between it and the humours of the eye, resists the total loss of sight. If this be evident of itself, it is equally obvious, that every known method, adapted to replace the prolapsus of the iris, must be useless, or dangerous.

In conformity to such principles, there are two principal indications for the surgeon to accomplish, in the treatment of the recent prolapsus of the iris. The first is, to diminish, as speedily as possible, the excess of exquisite sensibility in the protruded part of the iris; the other is gradually to destroy the projecting portion of this membrane, to such a depth, as shall be sufficient to prevent the little tumour from keeping the edges of the wound, or ulcer of the cornea, too much asunder, and, at length, retarding the cicatrization. The adhesion, however, which connects the iris with the inside of the cornea, must not be destroyed.

To fulfil these indications, nothing is more effectual than touching the portion of the iris projecting from the cornea, with the oxygenated muriate of antimony (*butter of antimony*), or with what is more expeditious and convenient, the argentum nitratum, so as to form an eschar of such a depth as occasion may require. That this operation may be effected with quickness and precision, it is necessary that an assistant, standing behind the patient's head, should support the upper eyelid with Pellier's elevator; and that the pa-

tient, if endued with reason, should keep his eye steadily fixed on one object.

While the assistant gently raises the upper eyelid, the surgeon must depress the lower one, with the index and middle fingers of his left hand; while, with the right, he is to be ready to touch the little prominence formed by the iris, with the argentum nitratum, scraped to a point like a crayon. This is to be applied to the centre of the little tumour, until an eschar of sufficient depth is formed. The pain which the patient experiences at this moment, is very acute; but, it subsides as soon as the eye is bathed with warm milk. The caustic, in destroying the projecting portion of the iris, destroys the principal organ of sensibility, by covering it with an eschar, of sufficient depth to protect the part affected from the effect of the friction of the eyelids, and from coming into contact with the air and tears. This is the precise reason, not only why the sense of pricking and constriction in the eye, of which such patients complain so much, abates after the application of the caustic, but also why the inflammation of the conjunctiva undergoes a considerable diminution, as well as the burning and copious effusion of tears.

As in the case of ulcer of the cornea, these advantages only last while the eschar remains adherent to the little tumour formed by the iris; when it falls off, as it usually does two or three days after the use of the caustic, all the above-mentioned symptoms are rekindled, with this difference, that they are less intense and acute, than they were previously, and the tumour of the iris is not so prominent as it was before the caustic was applied. When these symptoms make their appearance, the surgeon must once more have recourse to the argentum nitratum, with the precautions explained above; and he is to employ it a third, and even a fourth time, as occasion may require, until the prominent portion of the iris is sufficiently reduced to a level with the edges of the wound, or ulcer of the cornea, and no obstacle to the granulating process, and complete cicatrization continues.

There is a certain period, (as was stated in the article, *Cornea, Ulcers of*) beyond which the application of caustic to the protruded iris, becomes exceedingly dangerous, though at first it may have been highly beneficial; beyond which, the eschar, which previously soothed the pain, exasperates it, and re-produces the inflammation of the conjunctiva in almost as vehement a degree as in the beginning of the disease. This appears to Scarpa to be the case, whenever the surgeon continues to employ the caustic, after the little tumour of the iris has been destroyed to a level with the external edges of the wound, or ulcer of the cornea, and the application begins to destroy the granulations just as they are originating. Hence, in the treatment of this disease, as soon as the surgeon perceives, that the part of the iris, projecting from the cornea, is sufficiently lowered, and that the application of the argentum nitratum, far from allaying, only irritates the disease, he must desist entirely from using the caustic, and be content with introducing between the eye and eyelids, every two hours, a vitriolic collyrium with the mucilage of quince-seeds, or one composed of the sulphate of zinc and white of egg. He is to employ, successively every morning and evening, Janin's ophthalmic ointment, qualified with a double, or triple proportion of lard. If the stimulus of such local remedies should not disturb the work of nature, the ulcer is constantly seen to diminish gradually in size, and, in the course of a fortnight, to become covered with a cicatrix.

The adhesion, which the projecting part of the iris contracts to the internal margin of the wound, or ulcer of the cornea, during the treatment, continues the same after the perfection of the external cicatrix, and of course during the rest of the patient's life. Hence, even after the most successful treatment of the prolapsus of the iris, the pupil remains a little inclined towards the place of the cicatrix in the cornea, and of an oval figure. The change in the situation and shape of the pupil causes, however, little or no diminution of the patient's faculty of discerning distinctly the smallest objects; and is much less detrimental to the sight, than one, inexperienced in these matters might conceive; provided the scar on the cornea be not too extensive, nor situated exactly in the centre of this membrane. In the first case, the sight is the less obstructed, as the pupil, which, on the first occurrence of the prolapsus, was narrow, oblong, and drawn considerably towards the wound, or ulcer, gradually enlarges, and forms a less contracted oval. As soon as the wound is completely healed, the pupil tends, in some degree, to occupy its former situation in the centre of the cornea. Richter has, also, noticed this fact.

The mode of treating the prolapsus of the iris here explained, is what Scarpa has found to be the safest, and most effectual of all other methods, that have hitherto been proposed; not excepting that of removing the little tumour, formed by the iris on the surface of the cornea, by a stroke of the scissars.

Certainly, if the success of such a recision were to correspond, in all cases,

with the promises, which some surgeons have made, nothing would contribute in a greater degree to expedite the cure of the prolapsus of the iris. But, experience has informed Scarpa, that this recision can only be practised with a hope of success, when the iris has contracted a firm adhesion to the internal edge of the wound, or ulcer of the cornea; and, more especially in that ancient prolapsus of the iris, in which the projecting portion of the iris has become with time almost insensible, hard, and callous, with its base strangulated between the edges of the wound, or ulcer of the cornea, and besides being adherent to them, having also the shape of a slender pedicle. Scarpa adds, he has seen an incarcerated one fall off of itself.

In such circumstances, the recision of the old prolapsus of the iris is not attended with the least danger; for, after removing with a stroke of the scissars, that prominent portion of the iris, which has already contracted internal adhesions to the ulcerated margin of the cornea, so as to reduce it to a level with the external edges of the ulcer, there is no hazard of renewing the effusion of the aqueous humour, or giving an opportunity for another piece of the iris to be protruded. One, or two applications of the argentum nitratum suffice afterwards for the production of granulations on the ulcer of the cornea, and the formation of a cicatrix. But, it is not so, in the treatment of the recent prolapsus of the iris, which has no adhesions to the internal edges of the wound, or ulcer of the cornea.

In four subjects recently affected with prolapsus of the iris, after Scarpa had removed, with a pair of convex-edged scissars, a portion of that membrane projecting beyond the cornea, of about the size of a fly's head, it was with regret that he found, on the ensuing day, that a new portion of the iris, not less than the first, had made its way through the ulcer of the cornea, and that the pupil was very much contracted, and drawn considerably further towards the ulcer of the cornea. These circumstances took place, notwithstanding he touched the wound immediately afterwards with the argentum nitratum, as well as the edges of the ulcer of the cornea. He has therefore cause to fear, should he ever have occasion to divide such a little tumour again, that it would reappear, and always with an additional protrusion of the iris, and a further distortion of the pupil. Hence, the first lesson has made him content to treat the disease with caustic, in the manner explained above; and all the four subjects in question were successfully cured, excepting that their pupils, in consequence of being drawn too much towards the situation of the ulcer of the cornea, were more covered than they ought to have been, by the cicatrix.

Before concluding this article, we beg the attention of surgeons, to a particular species of prolapsus, much less frequent, indeed, than that of the iris; but, which does occur in practice, and, in Scarpa's opinion, is very improperly termed by modern oculists, "*prolapsus of the tunic of the aqueous humour.*" (*Janin, Pellier, Guérin, Gleize, &c.*)

This disease consists of a transparent vesicle, filled with an aqueous fluid, and composed of a very delicate membrane, which projects from the wound, or ulcer of the cornea, much in the same way as the iris does under similar circumstances. Scarpa has several times seen this transparent vesicle full of water, elongating itself beyond the cornea, shortly after the operation for the extraction of the cataract, and sometimes, also, in consequence of an ulcer of the cornea, especially after rescinding a prolapsed portion of the iris.

Oculists are, for the most part, of opinion, that this little transparent tumour consists of the delicate, elastic, diaphanous membrane, which invests the inner surface of the cornea, and is described by Descemet and Demours. "As soon as the membrane lining the cornea (they say) is exposed by the wound, or ulcer of the latter, and the delicate pellicle can no longer resist the impulse of the humours pressing behind it, it is necessitated to yield gradually, to become elongated, and to project from the wound, or ulcer of the cornea, exactly in the form of a pellucid vesicle." But, how remote this theory is from the truth, must be manifest to every one, who reflects at all on the following circumstances: 1. The delicate and elastic pellicle, described by Descemet and Demours, is not separable by any artifice from the inner surface of the cornea, except near where the cornea and sclerotica unite. Since these protruded vesicles make their appearance in practice at every point of the cornea, and even at its very centre, where the above pellicle is certainly neither separable, nor distinct from the compact texture of the cornea; it may at least be asserted, that the tunic of the aqueous humour does not, in every instance, constitute the transparent vesicle in question. 2. It is a well known fact, that this vesicular, pellucid prolapsus happens more frequently after the extraction of the cataract, than on any other occasion. In this case, since the tunic of the aqueous humour has certainly been divided to afford an exit to the crystalline, no one can be of opinion, that the transparent vesicle, which protrudes from the cornea after

this operation, ought to be attributed to the distention and protrusion of the tunic of the aqueous humour. 3. If, in cases of ulcers of the cornea, the transparent vesicle should sometimes appear after the recision of the prolapsus of the iris, it is obvious, that if it consisted of the tunic of the aqueous humour, it ought invariably to appear before the prolapsus of the iris. 4. Should the surgeon remove the protruded vesicle to a level with the cornea by a stroke of the scissars, a small quantity of limpid water is seen to ooze out, at the moment when the incision is made, without any part of the aqueous humour escaping from the anterior chamber. This inconvenience would be inevitable, were the protruded vesicle in question formed by the delicate elastic pellicle, which is said to invest the inner surface of the cornea. Besides, the little transparent tumour disappears when the incision is made; but oftentimes another one, exactly similar to what was cut off, is found in the very same place on the following day. Had the little transparent tumour been composed of the tunic of the aqueous humour, elongated out of the wound, or ulcer of the cornea, it could not at all events have been reproduced at the same part of the cornea.

Actuated by such reflections, it is clear to Scarpa, that the pretended prolapsus, of the tunic of the aqueous humour, is not what it is imagined to be; but, strictly speaking, nothing more than a forcible protrusion of a portion of the vitreous humour, which, from too much pressure being made on the eye, either at the time of the operation, or afterwards, or from a spasm of the muscles of the eye, insinuates itself between the edges of the wound after the extraction of the cataract, and projects in the form of a transparent vesicle. The same thing also happens after ulcers of the cornea, whenever the aqueous humour has escaped, and a portion of the vitreous humour is urged by forcible pressure towards the ulcer facing the pupil; or whenever an elongated piece of the vitreous humour, after the recision of a prolapsed portion of the iris, passes by a shorter route, than through the pupil, between the lips of the ulcer of the cornea. At length, we understand, why in both these instances a transparent vesicle forms, even after the recision of the tunic of the aqueous humour, or ulceration of the cornea; and why it very often reappears in the same place, though it has been cut away to a level with the cornea. It is because one or more cells of the vitreous humour, constituting the transparent vesicle, are succeeded after their removal by other cells of the same humour, which glide between the lips of the wound, or ulcer of the cornea, into the situation of the receding ones.

The treatment of this species of prolapsus consists in removing the transparent vesicle, projecting from the wound, or ulcer, by means of a cutting instrument, and bringing the edges of the wound of the cornea immediately afterwards into perfect apposition, in order that they may unite together as exactly as possible. But, when there is an ulcer of the cornea, as soon as the vesicle is removed, the sore must be touched with the argentum nitratum, so that the eschar may resist any new prolapsus of the vitreous humour, and at the same time dispose the ulcer of the cornea to granulate and heal.

In this kind of prolapsus, what protrudes through the cornea is only a subtile little membrane, filled with water, and quite destitute of sensibility. Its detachment from the rest of the eye, is a matter of trivial importance; while, on the contrary, its presence occasions all the inconveniences of an extraneous substance, that would prevent a wound from uniting, and an ulcer from healing. Hence, the detachment of the protruded vesicle is very justly indicated, and the success of the plan is confirmed by practice; doubtless, because the little transparent tumour can, in general, be expeditiously removed, by a stroke of the curved convex-edged scissars. But if, in some particular cases, the vesicle should not project sufficiently from the wound, or ulcer of the cornea, to be included in the scissars, the same object may be accomplished by puncturing the tumour with a lancet, or couching-needle; for, when the limpid fluid which it contains is discharged, the membrane forming it shrinks within the edges of the wound, or ulcer of the cornea, and no longer hinders the union of the former, or the cicatrization of the latter.

Should the transparent tumour reappear in the same situation, the day after its recision, or puncture, it is right to repeat one of these operations, and to adopt further measures for maintaining the wound of the cornea in contact; or, if it should be an ulcer, the eschar must be made to adhere more deeply to its bottom and sides, so as to form a greater obstacle than before to the escape of the vitreous humour. In such circumstances, the surgeon must take all possible care to obviate such causes as have a tendency to propel the vitreous humour towards the wound, or ulcer, of the cornea; particularly too much pressure on the eyelids, spasms of the muscles of the eye, coughing, sneezing, efforts at stool, and other

similar ones; and care must also be taken to check the progress of inflammation.

Pellier's two cases (*Obs. sur l'Œil*, p. 350.) on the treatment of this species of transparent vesicular prolapsus, deserve perusal. To these, if it were requisite, Scarpa says he could add several other similar ones, which have fallen under his own observation, in cases of ulcer of the cornea penetrating the anterior chamber of the aqueous humour, and which were attended with as much success as those related by the French oculist.

The choroid coat is, likewise, not exempt from prolapsus. Scarpa has seen and cured this complaint in M. Bressanini, an apothecary at Bescape. A small abscess, formed between the sclerotica and choroid coats, at the distance of two lines from the union of the cornea with the sclerotica, in the inferior hemisphere of the globe of the eye, in consequence of a severe internal and external ophthalmy, which had been treated, in its incipient state, with repellent remedies. The abscess burst, and discharged a small quantity of thick viscid lymph; then a small blackish body, composed of the choroid coat, presented itself on the outside of the little ulcer of the sclerotica. The treatment consisted in applying the argentum nitratum several times to the projecting portion of the choroides, until it was consumed, and reduced to a level with the bottom of the ulcer of the cornea. Then the place healed. The eye remained, however, considerably weakened, and the pupil became afterwards, so much contracted, that it was almost entirely closed. (*Scarpa sulle Principali Malattie degli Occhi. Venezia.* 1802.)

Consult also *Richter's Anfangsgrunde der Wundarzneykunst, Band* 3. *Von dem Vorfalle der Regenbogenhaut.*

For a description of the manner of dividing the iris, in order to make an artificial pupil, when the natural one is closed, refer to *Pupil, Closure of.*

A wound of the iris is one of the things most to be feared in extracting a cataract. No sooner does any instrument penetrate the eye, than the muscles of this organ usually contract in a spasmodic manner, so as to make great pressure on the part, and to urge forward the cataract and the iris. In this circumstance, we cannot wonder that the latter should now and then be injured by the edge of the instrument. When the iris becomes entangled under the knife, Wenzel asserts, that it may be invariably disengaged without injury, by gently touching the cornea with the finger. Richter justly observes, however, (*Anfangsgr. der Wundarzn.*) that this artifice is not unattended with some risk of pressing out the aqueous humour; especially, if the irritation of touching the eye should make it move, or the operator in the least disturb the knife. See *Cataract.*

ISCHU'RIA. (from ἰσχω, to restrain; and οὖρον, the urine.) A suppression, or stoppage of the urine.

The distinction between a *suppression* and *retention* of urine, is practical and judicious. The former most properly points out a defect in the secretion of the kidneys; the latter, an inability of expelling the urine when secreted. (*Hey.*)

The first disease is not very common, is named *ischuria rénalis*, or *suppression of urine*, and belongs to the province of the physician; the second is an exceedingly frequent disorder, is named *ischuria vesicalis*, or *retention of urine*, and its treatment is altogether surgical. Every thing relative to it will be found in the articles *Catheter*, and *Urine, Retention of.*

ISSUE signifies an ulcer made designedly by the practitioner, and kept open a certain time, or even the patient's whole life, for the cure, or prevention of a variety of diseases.

The physician, in his practice, has frequent occasion to recommend the making of an issue, and the surgeon finds it a principal means of relief in several important cases, as, for instance, the white swelling, the disease of the hip-joint, caries of the vertebræ, &c. Many persons are never in health, or, at least, fancy themselves always ill, unless they have an issue formed in some part of their body or another. The making of an issue, indeed, is not unfrequently considered as an imitation of nature, who, of her own accord, often forms ulcers and abscesses in various parts of the body (as is not uncommonly conjectured) for the purpose of discharging pernicious humours, whereby people are supposed to be freed from grievous disorders, and have their health preserved. The humoral pathologists were excessively partial to these notions, which, at the present time, will be found by every experienced practitioner to influence the mass of mankind, and render the formation of issues more common, than perhaps is consistent with the better established principles of medical science. Few old subjects will allow a sore of long standing to be dried up (as the expression is), without requiring the surgeon immediately afterwards to make an issue for them. When an ulcer has existed a great length of time, the constitution may possibly become so habituated to it, that the health may really suffer from its being healed. Asthmatic complaints, and severe head-

sachs are frequently observed to follow the cicatrization of an old ulcer; but, whether they would have happened, if an issue had been made in time, is a question difficult of positive determination; for, many persons with old ulcers are not prevented from suffering from asthma, and headach. The plan of making an issue, however, is commendable both as rational and exempt from danger. Whatever may be the solidity of the theories, which have been offered by medical writers, in regard to issues, the practitioner, who has his eyes open, cannot fail to see the benefit often derived from such means; and if there be any unquestionable facts in medicine and surgery, we may confidently set down amongst them the frequent possibility of relieving one disease by exciting another of a less grievous and more curable nature.

There are two ways of making an issue; one is with a lancet, or scalpel; the other, with caustic.

The place for the issue being fixed upon, the surgeon and his assistant are to pinch up a fold of the integuments, and, with a lancet or knife, make in them an incision of sufficient size to hold a pea, or as many peas as may be thought proper. The pea, or peas are then to be placed in the cut, and covered with a piece of adhesive plaster, a compress, and bandage. The peas, first inserted, need not be removed for three or four days, when suppuration will have begun; but, the issue is afterwards to be cleaned and dressed every day, and have fresh peas put into it. The preceding is the ordinary method of making such issues, as are intended to contain only one or two peas.

When the issue is to be larger, which is generally proper, in cases of diseased vertebræ, white swellings, &c. the best plan is to destroy a portion of the integuments with caustic. The kali purum, blended with quicklime, is mostly preferred for this purpose. The situation and size of the issue having been determined, the surgeon is to take care, that the caustic does not extend its action to the surrounding parts. With this view, he is to take a piece of adhesive plaster, and having cut a hole in it, of the exact shape and size of the issue intended to be made, he is to apply it to the part. Thus the plaster will defend the adjacent skin from the effects of the caustic, while the uncovered portion of integuments, corresponding to the hole in the plaster, is that which is to be destroyed. The caustic is to be taken hold of with a bit of lint, or tow, and, its end, having been a little moistened with water, is to be steadily rubbed upon the part of the skin, where the issue is to be formed. The frictions are to be continued, till the whole surface, intended to be destroyed, assumes a darkish corroded appearance. The caustic matter may now be carefully washed off with some wet tow. The plaster is to be removed, and a linseed poultice applied. As soon as the eschar is detached, or any part of it is loose enough to be cut away, without pain, or bleeding, the peas are to be inserted and confined in their proper place with a piece of adhesive plaster. Some use beans for the purpose; others beads; which answer very well, and have the advantage of serving for any length of time, when washed and cleaned every day. If the issue is at all of a longitudinal shape, the peas, beans, or beads, may be more easily kept in their places, when strung upon a thread.

Issues ought always to be made, if possible, in a situation, where the peas will not be much disturbed in the ordinary motions of the body, nor interfere with the actions of muscles. The interspaces, between the margins and insertions of muscles, are deemed the most eligible places. Thus, issues in the arm are usually made just at the inferior angle of the deltoid muscle, by the side of the external edge of the biceps. In the lower extremities, issues are often made at the inner side of the thigh, immediately above the knee, in a cavity, that may be readily felt there with the fingers. Sometimes, issues are made upon the inside of the leg, just below the knee. For the relief of any affections of the head, or eye, the nape of the neck is commonly selected as a good situation. In caries of the vertebræ, they are made on each side of the spinous processes. In cases of diseased hips, they are formed in a depression just behind and below the trochanter major. When the nature of the disorder does not particularly indicate the situation for the issue, the arm should be preferred to the leg, as issues upon the upper extremities, especially the left arm; are much less annoying, than upon either of the lower limbs.

The great art of keeping an issue open for a long while, consists in maintaining an equal and effectual pressure upon the peas, by which means, they are confined in their places, little depressions are made for them, and the granulations hindered from rising. Compresses of pasteboard and sheet-lead will often be found highly useful. This plan is the surest one of preventing the issue from healing, and the most likely to save the patient all the severe and repeated suffering, which the fresh application of the caustic, or the use of stimulating powders, in order to renew the sore and repress the fungous flesh, unavoidably occasion.

There is a method of making issues

with the caustic made into a sort of paste, which is laid upon the part left uncovered by the adhesive plaster. It seems to me to be a more tedious and painful plan, and I do not recommend it.

It has been suspected, that the pain, caused by the caustic, might be lessened, by mixing opium with the application; but, the idea seems not at all probable; the destruction of a part of the skin must inevitably cause considerable pain, with whatever substance it is produced, and opium itself, so far from being likely to diminish the agony, is itself a violent stimulus, whenever it comes into contact with the exposed extremities of the nerves.

J.

JOINTS, DISEASES OF. The joints are subject to numerous diseases, which are more, or less, alarming, according to their nature. Like all other parts, they are liable to inflammation and abscesses; their capsules frequently become distended with an aqueous secretion, and the disease termed *hydrops articuli*, is produced; but, the most important of all their morbid affections, are, what are called, *white swellings*, and the *disease of the hip-joint*.

WOUNDS OF JOINTS.

Wounds of the large joints, made either by puncture or incision, are of a very dangerous nature, as these parts are surrounded with tendinous and membranous structures, which, though not very sensible in a sound state, yet, when inflamed, become exquisitely sensible, often attended with vehement pain and fever, and sometimes with delirious symptoms. (See *Hunter's Commentaries*, *Part* 1, *p.* 69.)

Superficial wounds of the joints are often disagreeable cases; but the danger is always increased, when the injury penetrates the capsular ligament. This event may be detected by the introduction of a probe, and often by a discharge of the synovia, which is secreted by glands in the joint to facilitate its motion. But, as a discharge of a similar kind, may proceed from mere wounds of such *bursæ mucosæ*, as lie under the tendons of muscles, in the vicinity of joints, our judgment might be deceived, were we unacquainted with the situation of these little membranous bags. Wounds which penetrate large joints, must be looked upon as much more dangerous, than those, in which only these bursæ are opened.

When the large joints, particularly the knee, are wounded, the stomach is frequently very much affected. I remember being shewn by Mr. Best of Newbury, a man, who, in his occupation as a wheelwright, happened to give himself a wound on one side of the knee: a good deal of inflammation and suppuration ensued; but, what particularly struck me, was the manner in which the man complained of the affection of his stomach.

In speaking of cartilaginous substances in the joints, we shall have occasion to advert again to the danger attendant on wounds of these parts.

INFLAMMATION OF JOINTS.

Idiopathic cases of this kind are not common. The complaint ordinarily originates, in consequence of a contusion, sprain, wound, or some other kind of injury, done to the part affected.

The inflamed joint shews the common symptoms of inflammation; viz. preternatural redness, increased heat, throbbing, pain, and swelling, while the constitution is also disturbed by the usual symptoms of the inflammatory fever. It is highly deserving notice, however, that in these cases, such symptoms are often exceedingly severe, and the pulse is more frequent, and less full and strong, than when parts, more disposed to return to a state of health, are affected. The inflammation first attacks some part of the capsular ligaments, and very quickly diffuses itself universally over their whole extent, as usually happens in all inflammations of smooth membranes.

The capsules of the joints are naturally not very sensible; but, like many other parts similarly circumstanced, they become acutely painful, when inflamed. The complaint is accompanied with an increased secretion of the synovia, which becomes of a more aqueous, and of a less albuminous quality, than it is in the healthy state. Hence, this fluid is not so well calculated for lubricating the articular surfaces, and preventing the effects of friction, as it is in the natural condition of the joint. This circumstance may ex-

pla n, why a grating sensation is often perceived on moving the patella, when the knee is inflamed.

The capsular ligaments, like other parts, are frequently thickened by inflammation, and, sometimes, coagulating lymph, being effused on their internal surfaces, organized cartilaginous, or osseous bodies, are formed in their cavities.

When the inflammation attains a higher pitch, an abscess may occur in the capsular ligament. This part at length ulcerates, and the pus makes its way beneath the skin, and is sooner, or later, discharged through ulcerated openings.

An abscess rarely takes place in an important articulation, in consequence of acute inflammation, without the system being, also, so deranged, that life itself is imminently endangered. In the violent stage of the inflammation, just before the abscess forms, very severe symptoms of inflammatory fever afflict the patient, and, occasionally, delirium and coma taking place, death itself ensues.

In these cases, the inflammatory fever is very quickly converted into the hectic; indeed, when an abscess has taken place in a large joint, in consequence of acute inflammation, hectic symptoms almost immediately begin to shew themselves, and the strong actions of the common inflammatory fever suddenly subside.

Local consequences, even worse than those above described, may follow inflammation of a joint. As the layer of the capsular ligament, reflected over the cartilages of the articulation is often inflamed, the cartilages themselves are very apt to have the inflammation communicated to them. Parts partaking of a cartilaginous structure, being very incapable of bearing the irritation of disease, often ulcerate, or, in other words, are absorbed, so as to leave a portion, or, the whole, of the articular surface of the bones, completely denuded of its natural covering. At length, the heads of the bones themselves inflame, and become carious; or the consequence may be an anchylosis.

Sometimes, only such parts, as are exterior to the capsular ligament, are affected, and, in this case, the symptoms are never so severe, (*Russell on the Knee, p.* 60.) nor so obstinate, as when the complaint interests the capsular ligament, and parts contained in it. Even when an abscess takes place on the outside of the capsular ligament, the case cannot be considered as dangerous, provided the cavity of the joint be not involved in the inflammatory attack. Every inflammation of a large joint may be deemed a case of considerable importance. I do not mean to assert, that cases, in which the inflammation is mild in degree, and simple in its nature, are dangerous; no—I only wish to inculcate, that though the inflammation be originally genuine, it is always very likely to be converted into one of a specific nature, whenever there is a tendency in the system to scrofulous disorder. A person, whose constitution is scrofulous, may sometimes continue, during life, exempt from any local disease of this specific nature, provided he be fortunate enough to avoid all irritation of parts, on which scrofula is most particularly disposed to make its attack.—Among such parts we must class the joints, especially the knee, hip, elbow, and ankle. Hence, when a joint is inflamed, how mild soever the affection may be, we ought never to forget, that, when there is a tendency to scrofula in the system, the original case of simple inflammation is very apt to be the exciting cause of the white swelling, one of the most severe and intractable diseases, which increase the catalogue of human miseries.

Hence, the curative means should be most rigorously put in execution, not merely on account of an abstract view of the present state of the case; but, also, on account of the opportunity, which is now afforded for a terrible disease to arise, which often remains previously dormant.

It will considerably shorten what we have to say concerning the treatment of inflamed joints, to observe, that the antiphlogistic plan, in the full sense of the expression, is to be strictly adopted. But, as there is a variety of means, often adapted to the same purpose, it seems necessary to offer a few remarks on those, which lay the greatest claim to our commendations. The treatment of an inflamed knee will serve to illustrate that of all other large joints.

There are few other surgical cases, in which general, and, especially topical bleeding is more strongly indicated.

The violence of the inflammation, and the strength, age, and pulse of the patient, must determine, with regard to the use of the lancet; but, the topical application of leeches may be said to be invariably proper. When the leeches fall off, the bleeding is to be promoted by fomenting the part. The surgeon should daily persist in this practice, until the acute stage of the inflammation has subsided. But, in conjunction with this treatment, we are to keep the joint continually surrounded with linen wet with the saturnine lotion.

In a few instances, however, the patient seems to derive more ease and benefit from the employment of fomentations and emollient poultices, and the feelings of the afflicted should always be

consulted; for, if the pain be materially alleviated by this, or that application, its employment will hardly ever be wrong.

Nothing more need be said, concerning the rest of the treatment, proper during the vehemence of the inflammation, as the duty of the surgeon is not materially different from what it is in other inflammatory cases.

As soon as the acute stage of the affection has subsided, the grand object is to remove the effects, which have been left. These are a thickened state of the capsular ligament, and parts surrounding the articulations; a stiffness of the joint, and pain, when it is moved; a collection of fluid in the capsule, &c. This state of the complaint, when neglected, and there is a tendency to scrofula, may prove exceedingly obstinate, and even terminate in an irremediable, specific distemper of the joint.

When this second stage of the disorder seems tardy in going off, the application of a blister is proper, and it should be kept open for a few days, by means of the savin cerate.

In other cases, in which the inflammation has been more trivial, and the effects, which it has left, are slight; lotions, composed of vinegar and sal-ammoniac, suffice for the removal of the chronic complaints, continuing after the abatement of the acute stage of the disorder.

The severity of the constitutional symptoms is mostly, if not always, greater, when the inflammation of a large joint arises from a wound, than when it is the consequence of a bruise, or sprain. (See *Treatise on the Diseases of the Joints*, 1807.)

LOOSE CARTILAGES IN JOINTS.

The existence of extraneous bodies in the articulations is by no means a rare occurrence, though unknown to the ancients.

Paré is the first who speaks of this disorder: he says, that *a hard, polished, white body, of the size of an almond*, was discharged from the knee of a patient, in the year 1558, in which he had made an incision for an *aqueous apostème*, (without doubt an hydrops articuli.) *Liv.* 25, *chap.* 15.

One of these extraneous bodies was found on dissection in a knee-joint, by Dr. Alexander Monro. Mr. Simson extracted one of these some years afterwards, which at first he did not suppose was in the cavity of the articulation, notwithstanding its mobility, and the pain it occasioned. (*Edinb. Med. Essays.*) Since these periods, examples have been multiplied of this disease.

Such detached and moveable cartilages are not peculiar to the joint of the knee, they occasionally occur in other joints of the body; but they are most frequently met with in the knee, and it is in that joint that they produce symptoms which render them the object of a chirurgical operation. Morgagni has seen them in the ankle; Haller in the joint of the jaw; and Hey in the elbow.

These substances, in their structure, are, as Mr. Home remarks, analogous to bone; but, in their external appearance, bear a greater resemblance to cartilage. They are not, however, always exactly of the same structure, being in some instances softer, than in others. Their external surface is smooth and polished, which, being lubricated by the synovia, allows them to be moved readily from one part of the joint to another, seldom remaining long at rest, while the limb is in motion; when they happen to be in such situations as to be pressed upon with force by the different parts of the joint, they occasion considerable pain, and materially interfere with its necessary motions.

The circumstance of their being loose, and having no remains of a visible attachment, made it difficult to form conjectures respecting their formation; and according to Mr. Home, no satisfactory account of their origin had been given, till Mr. Hunter's observations threw light upon the subject. The circumstances, which led him to the investigation of this subject, appear at first sight so foreign to the purpose, that they require some explanation.

In the course of his experiments and observations, instituted with a view to establish a living principle in the blood, Mr. Hunter was naturally induced to attend to the phenomena, which took place, when that fluid was extravasated, whether in consequence of accidental violence, or other circumstances. The first change which took place he found to be coagulation; and the coagulum thus formed, if in contact with living parts, did not produce an irritation similar to extraneous matter, nor was it absorbed and taken back into the constitution, but, in many instances, preserved its living principle, and became vascular, receiving branches from the neighbouring blood-vessels for its support; it afterwards underwent changes, rendering it similar to the parts to which it was attached, and which supplied it with nourishment.

In attending to cases of this kind, he found that where a coagulum adhered to a surface, which varied its position, adapting it to the motions of some other part; the attachment was necessarily diminished by the friction, rendering it in

some instances pendulous, and in others breaking it off entirely.

Hence it was easy to explain the mode in which those pendulous bodies are formed, which are sometimes attached to the inside of circumscribed cavities, and the principle being established, it became equally easy for Mr. Hunter to apply it under other circumstances, since it is evident from a known law in the animal economy, that extravasated blood, when rendered an organized part of the body, can assume the nature of the parts into which it is effused, and consequently, the same coagulum which in another situation might form a soft tumour, would when situated on a bone, or in the neighbourhood of bone, often form a hard one. The cartilages found in the knee-joint, therefore, appeared to him to originate from a deposit of coagulated blood upon the end of one of the bones, which had acquired the nature of cartilage, and had afterwards been separated. This opinion was further confirmed by the examination of joints which had been violently strained, or otherwise injured, where the patients had died at different periods after the accident. In some of these there were small projecting parts, preternaturally formed, as hard as cartilage, and so situated, as to be readily knocked off by any sudden, or violent motion of the joint. (*Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol.* 1.)

One or more of these preternatural bodies may be formed in the same joint. Mr. Home mentions one instance in which there were three; they are commonly about the size of a horse-bean, often much smaller, and sometimes considerably larger; when very large, they do not give so much trouble to the patient as the smaller kind. A soldier in the 56th regiment has one nearly as big as the patella, which occasions little uneasiness, being too large to insinuate itself into the moving parts of the joint. Morgagni has seen twenty-five in one joint.

If we except making an incision into the joint, for the purpose of extracting the cartilaginous tumours, we are not acquainted with any certain means of freeing a patient from the inconvenience of this complaint. To this plan, the danger attendant on all wounds of so large an articulation as the knee, is a very serious objection. Middleton and Gooch endeavoured to conduct the extraneous body into a situation, where it produced no pain, and to retain it in that position, a long time, by bandages, under the idea, that the cartilaginous substance would adhere to the contiguous parts, and occasion no future trouble. Some will be inclined to think, that no positive conclusion ought to be drawn from the cases brought forward by these gentlemen, because they had no opportunity of seeing their patients again at the end of a reasonable length of time, and we know, that loose cartilages in the joints, sometimes disappear for half a year, and then make their appearance again. Yet, perhaps, the very circumstance of the patients not applying again, may appear to many to justify the inference, that sufficient relief had been obtained.

Mr. Hey, impressed with a just sense of the dangerous symptoms, which have occasionally resulted from the most simple wounds penetrating the knee-joint, very laudably tried the efficacy of a laced knee-cap, and the cases, which he has adduced, clearly demonstrate, that the benefit, thus obtained, is not temporary, at least, as long as the patient continues to wear the bandage. In one case, the method had been tried for ten years, with all the success, which the patient could desire.

Contemplating the evidence, which we have upon this point, and the perilous symptoms, sometimes following wounds of the knee-joint, I am decidedly of opinion, that the effect of a knee-cap, or of a roller and compress, applied over the loose cartilage, when this body is so situated as not to create pain, and to admit of being compressed, ought generally to be tried, before having recourse to excision. I say generally, because the conduct of the surgeon ought, in such cases, to be adapted to the condition, and inclination of the patient. If a man be deprived of his livelihood by not being able to use his knee; if he cannot, or will not take the trouble of wearing a bandage; if he be urgently desirous of running the risk of the operation after things have been impartially explained to him; if a bandage should not be productive of sufficient relief; and, lastly, if excessive pain, severe inflammation of the joint, and lameness, should frequently be produced by the complaint; I think it is the duty of a surgeon to operate. It is very certain, that success has generally attended the operation; but, small as the chance is of losing the limb, and even life, in the attempt to get rid of the disease; yet, since the inconveniences of the complaint are, in most cases, very bearable, and are even capable of palliation by means of a bandage, endangering the limb and life in any degree, must seem to many persons contrary to the dictates of prudence. I am ready to allow, with M. Brochier, that the danger, attendant on wounds of the large joints, has always been exaggerated in consequence of ancient prejudices. (*Desault's Journal, Vol.* 2.) But, making every allowance for the

influence of prejudice, a man must be very sceptical indeed, who does not consider the wound of so large a joint as the knee, attended with real cause for the apprehension of danger. See Case 2, in my *Treatise on the Diseases of the Joints*. At the end of Mr. Ford's case, (*Med. Obs. and Inquiries, Vol.* 5.) we read on the subject of cutting loose cartilages out of the knee: "The society have been informed of several cases, in which the operation has been performed; some, like this, have healed up, without any trouble; others have been followed with violent inflammation, fever, and death itself."

As the disorder is often attended with a degree of heat and tenderness in the articulation; as the danger of the operation is, in a great measure, proportioned to the subsequent inflammation; and, as much of the danger is at once removed, if the wound unite by the first intention: the advice, to keep the patient in bed, a few days before operating, to apply leeches, and cold saturnine lotions to the knee during the same time, and to exhibit beforehand a saline purgative, is highly prudent.

I shall next introduce an account of the plan of operating, as described by several of the best modern surgeons.

"As these loose bodies cannot always be found, no time can be fixed for the operation; but the patient, who will soon become familiar with his own complaint, must arrest them when in a favourable situation, and retain them there till the surgeon can be sent for.

"Before the operation, the limb should be extended upon a table in an horizontal position, and secured by means of assistants; the loose cartilages are to be pushed into the upper part of the joint above the patella, and then to one side; the inner side is to be preferred, as in that situation only the vastus internus muscle will be divided in the operation. Should there be several of these bodies, they must be all secured, or the operation should be postponed till some more favourable opportunity, since the leaving of one will subject the patient to the repetition of an operation, not only painful, but attended with some degree of danger.

"The loose bodies are to be secured in the situation above-mentioned by an assistant, a task not easily performed while they are cut upon, from their being lubricated by the synovia; and if allowed to escape into the general cavity, they may not readily, if at all, be brought back into the same situation.

"The operation consists in making an incision upon the loose cartilage, which it will be best to do in the direction of the thigh, as the wound will more readily be healed by the first intention. If the skin is drawn to one side, previously to making the incision, the wound through the parts underneath will not correspond with that made in the skin, which circumstance will favour their union. The incision upon the cartilage must be made with caution, as it will with difficulty be retained in its situation if much force is applied. The assistant is to endeavour to push the loose body through the opening, which must be made sufficiently large for that purpose; but as this cannot always be done, the broad end of an eyed probe may be passed under it, so as to lift it out, or a sharp-pointed instrument may be stuck into it, which will fix it to its situation, and bring it more within the management of the surgeon.

"The cartilages being all extracted, the cut edges of the wound are to be brought together, and, by means of a compress of lint, not only pressed close to one another, but also to the parts underneath, in which situation they are to be retained by sticking plaster, and the uniting bandage.

"As union by the first intention is of the utmost consequence after this operation, to prevent an inflammation of the joint, the patient should remain in bed with the leg extended, till the wound is perfectly united, or at least all chance of inflammation at an end." (*Home, in Med. and Chir. Transactions, Vol.* 1, *p.* 239, &c.)

In one instance, Desault proceeded in the following manner: the surgeon, after relaxing the capsular ligament by extending the leg, brought the extraneous body on the inside of the articulation against the attachment of the capsular ligament, and secured it in this situation, between the index finger and thumb of the left hand, whilst an assistant drew the integuments forwards towards the patella. All the parts that covered this extraneous body were now divided by a longitudinal incision, one inch in length, and its extraction accomplished by pushing it from above downwards, and raising it inferiorly with the end of the knife. This substance, on examination, was found similar in colour to the cartilages that cover the articular surfaces: it was three quarters of an inch in length, six lines and an half in width, and three lines in thickness; its surfaces were smooth, one concave and the other convex; its circumference irregular, disseminated with red points, forming small depressions; the inside was ossified, the outside of a cartilaginous texture. As soon as the substance was extracted, the assistant let go the integuments which he had drawn forwards; they consequently returned to their natural situation, on the inner side of the knee-joint, in such a manner, that the external wound in the

integuments was situated more inwards than the one in the capsular ligament. Two advantages were procured by this means: on the one hand, air was prevented from penetrating into the articulation; and on the other, the floating portion of capsular ligament, retained inwards by the skin, was more likely to attach itself to the condyle, in case it did not unite to the other portion of the capsule divided near its attachment. The edges of the wound were brought in contact by means of a uniting bandage; dry lint and compresses were applied, and retained on the part by a slight bandage; the limb was kept in a state of extension. (*Desault's Plan, as described by Brochier in Desault's Journal, Tom.* 2.)

The inner surface of the internal condyle of the os femoris presents an extensive and nearly plain surface, which terminates in front and at its upper part by an edge which forms a portion of a circle. If the points of the finger be firmly pressed upon this edge so as to form a kind of line of circumvallation round these (cartilaginous) bodies, they cannot pass into the joint in this direction, nor can they recede in any other, on account of the tense state of the internal lateral ligament. Here these substances are near the surface, and may be distinctly felt; and there is nothing to be divided in order to expose them, but the integuments, fascia, and the capsule of the joint.

In an interesting case, which Mr. Abernethy relates, he observes: "The operation was done in the following manner. Sir Charles Blicke, who assisted me, pressed the integuments of the knee, gently towards the internal condyle, and then applied his fingers in the manner I have described, round the circular edge of the bone. I also drew the integuments gently towards the inner ham-string, and divided them longitudinally, immediately over the loose substance, to the extent of an inch and an half. This withdrawing of the integuments from their natural situation was designed to prevent a direct correspondence in the situation of the external wound, and that of the capsule of the joint; for when the integuments were suffered to regain their natural position, the wound in them was nearer to the patella, than the wound which was made in the capsule. The fascia which covers the joint being exposed by the division of the integuments, it was divided in a similar direction, and nearly to the same extent. The capsule was now laid bare, and I gently divided it to the extent of half an inch, where it covered one of the hard substances, which suddenly slipped through the opening, and by pressing gently upon the other, it also came through at the same part. The bodies which were thus removed, were about three quarters of an inch in length, and half an inch in breadth. They had a highly polished surface, and were hard like cartilage. The fluid contained in the joint was pressed toward the wound, and about two ounces of synovia were discharged. I then drew the wound of the integuments gently towards the patella, pressed the two sides together, and closed it accurately with sticking plaster, enjoining the patient to keep the limb as free from motion as possible." (*Surgical Observations*, 1804.)

On the preceding subject some observations have been lately published by M. Larrey. (See *Mémoires de Chirurgerie Militaire, tom.* 2. *p.* 421, *&c.*) With the exception of a few wrong theories, he appears to have given a very fair account of the disease.

HYDROPS ARTICULI.

This signifies a collection of serous fluid in the capsular ligament of a joint. The complaint is attended with more or less swelling, and a fluctuation, but, there is, in general, but little pain. The affection is sometimes situated in the bursæ mucosæ. The knee is more subject, than other joints, to dropsical disease. The complaint is frequently preceded by severe rheumatic affections, and a local injury of the part. When the fluid is not so copious as to produce very great distention of the capsule, a fluctuation is easily distinguishable. Also, if the limb be extended, so as to relax the ligament of the patella, pressing the collection of fluid causes a rising of that bone, and a fulness on each side of it. The disease, though unattended with much pain, produces a degree of rigidity in the joint.

Mr. Russell has adopted the opinion, that some cases of this kind are venereal, and others scrophulous; but, he has not supported the doctrine on any solid foundation. Hydrops articuli sometimes follow fevers.

The cure of the above described dropsical affection of the joints, depends upon the absorption of the effused fluid. Such absorption is sometimes altogether spontaneous, and the event may always be excited, and promoted, by mere friction, by rubbing the joint with camphorated mercurial ointment, by repeatedly applying leeches, and particularly, by the employment of a perpetual blister.

The operation of a blister may always be very materially assisted by a bandage, applied with moderate tightness. Among other effectual means of cure, we may enumerate frictions with flannel impregnated with the fumes of vinegar; electri-

city; and the exhibition of mercurial medicines to open the bowels. When hydrops articuli occurs during the debility, consequent to typhoid, and other fevers, the complaint can hardly be expected to get well before the patient has regained some degree of strength.

Circumstances do not often justify making an opening into the joint; but, excessive distention, in some neglected cases, might certainly be an urgent reason for performing such an operation. Also, if the complaint should resist all other plans of treatment, and the irritation of the tumour greatly impair a weak constitution, the practice would be justifiable. An interesting example of this kind is related by Mr. Latta. (*System of Surgery, Vol.* 2. *p.* 490.)

It is best to make the opening in such a way, that the wound in the capsular ligament after the operation, will not remain directly opposite the wound in the skin. For this purpose, the integuments are to be pushed to one side, before the surgeon makes an incision through them. (*Encyclopédie Méthod. Part. Chir. Art. Hydropisie des Jointures.*)

COLLECTIONS OF BLOOD IN JOINTS.

Most systematic writers speak of this kind of case, though it is certainly a very uncommon one. Tumours, about the joints, composed of blood, and set down in numerous surgical works, as extravasations within the capsular ligaments, are generally on the outside of them.

Certainly, were a collection of fluid to take place in a joint very suddenly, after a sprain, or contusion, and to continue to increase gradually, for some time afterwards, there would be reason for believing, that most of the contents of the tumour was blood. The production of an abscess, and the secretion of any fluid, would have required a longer time.

Were blood known to be undoubtedly effused in a large articulation, no man would be justified in making an opening for its discharge. No bad symptoms are likely to result from its mere presence, and the absorbents will, in the end, take it away. Should an incision be made into the joint, the coagulated state of the extravasated blood would frequently not allow such blood to be discharged.

The best plan is to apply discutient remedies; a lotion of vinegar and sal ammoniac is the best application for the first three or four days, and, afterwards frictions with camphorated liniments may be safely had recourse to.

Mr. Hey has related a case, in which the knee-joint was wounded, and blood insinuated itself into the capsular ligament; yet, though the occurrence could not be hindered, no harm resulted from the extravasation which was absorbed, without having created the smallest inconvenience. (*Practical Observations in Surgery, p.* 354.)

WHITE SWELLING.

The white swelling, or spina ventosa, as it is not unfrequently called, in imitation of the Arabian writers, Rhazes and Avicenna, is in this country, a peculiarly common, and an exceedingly terrible disease. As I have stated in my *Treatise on the Diseases of the Joints*, the people of the continent are, unquestionably, as subject as we are, to chronic enlargements of the knee-joint. Foreign surgeons describe numerous varieties of a disease, which many English surgeons would term, *rheumatic white swellings*, but they acknowledge, that the scrophulous species of this disorder does not commonly occur to their notice. (*Kortum de Vitio Scrophuloso, Vol.* 2, *p.* 333. *Brambilla in Acta Acad. Med. Chir. Vindobonensis, Vol.* 1. *p.* 20. *Petit sur les Maladies des Os, Vol.* 2. *p.* 359. *Edit.* 1749.)

Wiseman was the first who used the term White-Swelling; and the expression is not very unapt, because it conveys an idea of one mark of the distemper, which is, that notwithstanding the increase of size in the joint, the skin is not inflamed, but retains its natural colour. (*Pott.*)

The varieties of white swellings are very numerous, and might usefully receive particular appellations. Systematic writers have generally been content with a distinction into two kinds, viz. *rheumatic*, and *scrophulous*.

The last species of the disease they also distinguish into such tumours as primarily affect the bones, and then the ligaments and soft parts; and into other cases in which the ligaments and soft parts become diseased, before there is any morbid affection of the bones.

These divisions of the subject appear hardly comprehensive enough; and the propriety of using the term, *rheumatic*, seems very questionable.

Sometimes, the bones, ligaments, and cartilages, are hardly at all diseased. The whole disease of the joint appears to arise from an extravasation of glutinous lymph, which is intimately adherent to the most subtile layers of the cellular substance, and to the surface of the tendons, ligaments, and capsule of the articulation. This distemper has been named by Brambilla, *Fungus Articulationis. Acta Acad. Medico-Chirurg. Vindob. p.* 1.

Sometimes, the bones are not in the least diseased, though the ligaments and cartilages are much altered, the joint is immensely enlarged, and the severity of

the disease has even rendered amputation indispensable.

Sometimes, the ligaments, cartilages, and bones are not the parts, which are chiefly distempered. In the instances, alluded to, the articulation is greatly increased in size, but, most of the swelling originates from a diseased state of the parts on the outside of the capsular ligament. The disease does not consist of a thick kind of lymph, diffused throughout the structure of the parts on the outside of the joint; but, of a morbid change, in which such parts become at once enlarged, thickened, and bereft of all their original firmness. Very frequently, the texture of the heads of the bones is softened, the ligaments are distempered, the cartilages absorbed, and the bones carious.

Sometimes, the surfaces of the diseased bones are rendered rough and irregular by the secretion of a kind of substance like spermaceti in appearance, but, containing a proportion of phosphate of lime.

It has been too commonly inculcated, that the bones are always carious in this disease. But, as I have explained, caries only comes on in an advanced stage of the malady. The idea of there being invariably a carious affection of the bones led the old surgeons into the most unwarrantable practices, with a view of promoting the process of exfoliation.

In numerous cases, in which the articulation is considerably enlarged, the heads of the bones are entirely free from distemper. Mr. Russell has noticed how much the soft parts frequently contribute to the swelling. He describes the appearances on dissection thus: "The great mass of the swelling appears to arise from an affection of the parts, exterior to the cavity of the joint, and which, besides an enlargement in size, seem also to have undergone a material change in structure. There is a larger, than natural, proportion of a viscid fluid, intermixed with the cellular substance; and the cellular substance itself has become thicker, softer, and of a less firm consistence, than in a state of health." (*On the Morbid Affections of the Knee, p.* 30.)

We may infer from what Mr. Russell states, that he is inclined to believe, that the disease always begins in the ligaments and membranes of the articulation, and he even asserts, that *he had never heard nor known of an instance, in which the tibia was enlarged from an attack of white swelling. P.* 37. It is still a very prevailing notion, that, in white swellings, the heads of the bones are preternaturally enlarged.

Deceived by the feel of many diseased joints, and influenced by general opinion, I once imbibed the idea, that there is very frequently a regular expansion of the heads of scrophulous bones. But, excepting an occasional enlargement, which arises from spiculæ of bony matter, deposited on the outside of the tibia, ulna, &c. and which alteration cannot be called an expansion of those bones, I have never been an eye-witness of the head of a bone being of preternaturally large dimensions, in consequence of the disease known by the name of white swelling. I have often been in the habit of inspecting the state of the numerous diseased joints, which are every year amputated at St. Bartholomew's Hospital, and though I have long been attentive to this point, my searches after a really enlarged scrophulous bone have always been in vain. The change, which the head of the tibia undergoes in many cases, is first a partial absorption of the phosphate of lime throughout its texture, while a soft kind of matter seems to be secreted into its substance. In a more advanced stage, and, indeed, in that stage, which most frequently takes place before a joint is amputated, the head of the bone has deep excavations in consequence of caries, and its structure is now so softened, that when an instrument is pushed against the carious part, it easily penetrates deeply into the bone.

A cursory examination of a diseased joint, even when it is cut open, will not suffice to shew, that the heads of the bones have not acquired an increase of size. In making a dissection of this kind, in the presence of a medical friend, I found, that, even after the joint had been opened, the swelling had every appearance of arising from an actual expansion of the bones. The gentleman with me felt the ends of the bones after the integuments had been removed, and he coincided with me, that the feel, which was even now communicated, seemed to be caused by a swelling of the bones themselves. But, on cleaning them, the enlargement was demonstrated to arise entirely from a thickening of the soft parts. I am glad to find, that Mr. Crowther is among those, who now disbelieve in the doctrine of expanded scrophulous bones. (See *Practical Observations on White Swelling, &c. Edit.* 2. *p.* 14. 1808.)

The soft parts undergo a material change; they are both thickened and softened, and there is a large quantity of a viscid fluid, intermixed with the cellular substance. In short, the whole texture of the cellular membrane becomes thicker and softer, than in the healthy state.

In the cavity of the joint, we sometimes find a quantity of curdy matter, and the cartilages absorbed in various places, but, more particularly round the edges of the articular surfaces.

The knee, ankle, wrist, and elbow, are the joints most subject to white swellings. As the name of the disease implies, the

skin is not at all altered in colour. In some instances the swelling yields in a certain degree to pressure; but it never pits, and is almost always sufficiently firm to make an uninformed examiner believe, that the bones contribute to the tumour. The pain is sometimes vehement from the very first; in other instances there is hardly the least pain in the beginning of the disease. In the majority of scrophulous white-swellings, let the pain be trivial, or violent, it is particularly situated in one part of the joint; viz. either the centre of the articulation, or the head of the tibia. Sometimes, the pain continues without interruption; sometimes there are intermissions; and, in other instances, the pain recurs at regular times, so as to have been called by some writers, periodical. Almost all authors describe the patient, as suffering more uneasiness in the diseased part, when he is warm, and, particularly, when he is in this condition in bed.

At the commencement of the disease, in the majority of instances, the swelling is very inconsiderable, or there is even no visible enlargement whatever. In the little depressions, naturally situated on each side of the patella, a fulness first shews itself, and gradually spreads all over the affected joint.

The patient, unable to bear the weight of his body on the disordered joint, in consequence of the great increase of pain, thus created, gets into the habit of only touching the ground with his toes, and the knee being generally kept a little bent in this manner, soon loses the capacity of becoming completely extended again. When white swellings have lasted a good while, the knee is almost always found in a permanent state of flexion. In scrophulous cases of this kind, pain constantly precedes any appearance of swelling; but the interval between the two symptoms differs very much in different subjects.

The morbid joint, in the course of time, acquires a vast magnitude. Still the integuments retain their natural colour, and remain unaffected. The enlargement of the articulation, however, always seems greater than it really is, in consequence of the emaciation of the limb both above and below the disease.

An appearance of blue distended veins, and a shining smoothness, are the only alterations to be noticed in the skin covering the enlarged joint. The shining smoothness seems attributable to the distention, which obliterates the natural furrows and wrinkles of the cutis. When the joint is thus swollen, the integuments cannot be pinched up into a fold, as they could in the state of health, and even in the beginning of the disease.

As the distemper of the articulation advances, collections of matter form around the part, and at length burst. The ulcerated openings sometimes heal up; but, such abscesses are generally followed by other collections, which pursue the same course. In some cases, these abscesses form a few months after the first affection of the joint; on other occasions, several years elapse, and no suppuration of this kind makes its appearance.

Such terrible local mischief must necessarily produce constitutional disturbance. The patient's health becomes gradually impaired, he loses both his appetite and natural rest and sleep; his pulse is small and frequent; an obstinate debilitating diarrhœa, and profuse nocturnal sweats, ensue. Such complaints are, sooner or later, followed by dissolution, unless the constitution be relieved in time, either by the amendment, or removal of the diseased part. In different patients, however, the course of the disease, and its effects upon the system, vary very much in relation to the rapidity with which they occur.

Rheumatic White-Swellings are very distinct diseases from the scrophulous distemper of the large joints. In the first, the pain is said never to occur without being attended with swelling. Scrophulous white-swellings, on the other hand, are always preceded by a pain, which is particularly confined to one point of the articulation. In rheumatic cases, the pain is more general, and diffused over the whole joint.

It seems probable, that all cases, in which the structure of the bones is found quite undiseased, and in which all the mass of disease seems to be confined to the soft parts, are not scrophulous white-swellings. Few persons, who have attained the age of five and twenty, without having had the least symptom of scrophula, ever experience, after this period of life, a first attack of the white swelling of the strumous kind. All cases, in which the internal structure of the heads of the bones becomes softened, are probably scrophulous.

Mr. Russell has noticed the frequent enlargement of the lymphatic glands in the groin, in consequence of the irritation of the disease when in the knee; but, he justly adds, that this secondary affection never proves long troublesome.

When the bones are diseased, the head of the tibia always suffers more than the condyles of the thigh bone. (*Russell.*) The articular surface of the femur sometimes has not a single rough or carious point, notwithstanding that of the tibia may have suffered a great deal. The cartilaginous coverings of the heads of the bones are generally eroded first at their edges; and, in the knee, the cartilage of

the tibia is always more affected than that covering the condyles of the thigh bone. Indeed, when white-swellings have their origin in the bones, and the knee is the seat of the disorder, there is some ground for supposing, that it is in the tibia, that the morbid mischief first commences.

The ligaments of the knee are occasionally so much weakened, or destroyed, by this terrible malady, that the tibia and fibula become, more or less, dislocated backward, and drawn towards the tuberosity of the ischium, by the powerful action of the flexor muscles of the leg.

I have seen a curious species of white swelling, in which the leg could be bent to each side in a very considerable distance, both when the knee was extended and bent. Such a state implies a preternatural looseness of the ligaments of the articulation.

With respect to the particular causes of all such white-swellings, as come within the class of rheumatic ones, little is known. External irritation, either by exposure to damp or cold, or by the application of violence, is often concerned in bringing on the disease; but, very frequently, no cause of this kind can be assigned for the complaint. As for scrophulous white-swellings, there can be no doubt, that they are under the influence of a particular kind of constitution, termed a *scrophulous* or *strumous habit*. In this sort of temperament, every cause capable of exciting inflammation, or any morbid and irritable state of a large joint, may bring on such disorder as may end in the severe disease of which we are now speaking.

In a man of a sound constitution, an irritation of the kind alluded to, might only induce common healthy inflammation of the affected joint.

In scrophulous habits, it also seems probable, that the irritation of a joint is much more easily produced than in other constitutions; and no one can doubt, that when once excited in the former class of subjects, it is much more dangerous, and difficult of removal, than in other patients.

The doctrine of particular white-swellings being scrophulous diseases, is supported by many weighty reasons, the opinions of the most accurate observers, and the evidence of daily experience. Wiseman (*Book 4, chap. 4.*) calls the *spina ventosa* a species of scrophula, and tells us, that infants and children are generally the subjects of this disease. The disorder is said by Severinus to be exceedingly frequent in young subjects. Petrus de Marchettis has observed both male and female subjects affected with what are called strumous diseases of the joints, as late as the age of five and twenty; but not afterwards, unless they had suffered from scrophula before that period of life, and had not been completely cured. R. Lowerus also maintains a similar opinion. Even though a few persons may have scrophulous diseases of the joints, for the first time, after the age of twenty-five, this occurrence, like the first attack of scrophula after this period, must be considered as extremely uncommon.

Another argument, in favour of the doctrine, which sets down particular kinds of white-swellings as scrophulous, is founded on the hereditary nature of such forms of disease.

Numerous continental surgeons, particularly Petit and Brambilla, have noticed how very subject the English are both to scrophula and white-swellings of the joints. We every day see, that young persons afflicted with the present disease, are generally manifestly scrophulous, or have once been so. Very often enlarged lymphatic glands in the neck denote this fatal peculiarity of constitution; very often the patients are known to have descended from parents who had strumous disorders. (*Crowther.*)

Besides the general emblems of a scrophulous constitution, which we shall notice in the article *Scrophula*, we may often observe a shining, coagulated, flaky substance, like white of egg, blended with the contents of such abscesses as occur in the progress of the disease. This kind of matter is almost peculiar to scrophulous abscesses, and forms another argument in support of the foregoing observations relative to the share, which scrophula frequently has in the origin and course of many white-swellings.

TREATMENT OF WHITE-SWELLINGS.

In practice we meet with all these cases both scrophulous and rheumatic ones, in two very opposite states; sometimes the diseased joint is at the same time affected with a degree of acute inflammation; in other instances, the malady is entirely chronic.

The imprudence of patients in walking about, and disturbing the diseased part, is very often the occasion of a degree of acute inflammation, which is denoted by the tenderness of the joint when handled by the surgeon, and also by the integuments feeling hotter than those of the healthy knee. Acute inflammation is itself a frequent forerunner of the most inveterate diseases of the joints.

When such state exists, there can be no doubt, that topical bleeding, and cold saturnine lotions, are means which may be eminently serviceable. The antiphlogistic regimen is now strongly indicated. Cooling purges of the saline kind should also be exhibited. Blood may be taken from

the diseased part, either by means of leeches or cupping. Mr. Latta gives the preference to the latter method, whenever it can be employed; and he very properly remarks, that little advantage can be expected from topical bleeding of any kind, unless the quantity of blood taken away be considerable. Ten or twelve ounces by cupping should be taken away at a time, and the operation should be repeated at proper intervals, till the tenderness and heat of the skin have entirely subsided. When leeches are used, the number ought to be considerable, and Mr. Latta recommends the application of at least sixteen or twenty. (*System of Surgery, Vol.* i. *chap.* 6.)

When the diseased joint is very tense, painful, and inflamed, the pressure of cupping glasses is too irritating.

Though such antiphlogistic means are judiciously put into practice, when acute inflammation prevails; yet such practitioners as lose weeks and months in the adoption of this treatment, are highly censurable. While the skin is hot and tender, while the joint is affected with very acute and general pain, and while the patient is indisposed with the usual symptoms of inflammatory fever, great benefit may be rationally expected from the above plan. When, however, this stage of the disorder is over, and the disease is a truly chronic one, the method becomes ridiculously inert, and, as preventing the employment of a proper plan of treatment may be considered, in a certain degree, conducive to the augmentation of a most cruel distemper. Every conscientious surgeon would shudder to be guilty of recommending inactive measures to oppose an inveterate disease, were he only to have a proper idea of the vast number of lives and limbs which are continually falling sacrifices to such slovenly practice.

Although I am not fortunate enough to coincide with Mr. Crowther on this point, who employs bleeding for a much longer time, than seems to me advantageous, yet I am content to let general experience determine which of us is right. There are some cases, I know, (and one such I had lately under my care in private practice,) which require topical bleeding and cold applications much longer than others. There are other instances, which will never bear the irritation of blisters and the savine cerate, but are exasperated by this treatment. Such, however, is not the nature of the disease in general, when the acute inflammation, accidentally present, has been removed by antiphlogistic means. Having seen numerous white-swellings in St. Bartholomew's Hospital, invariably unretarded by a long recourse to that universal panacea, *white wash*, aided by topical bleeding, I must feel satisfied that the censures I have passed on delaying the application of perpetual blisters, or issues, are not altogether unfounded. It is curious, that, after criticising my advice not to lose weeks and months in trusting to such treatment, when the acute symptoms have ceased, Mr. Crowther should remark: "If Mr. Cooper means by really efficacious measures, the application of blistering plaster, and dressing the surface, after the cuticle is removed, with the savine cerate, or establishing caustic issues on each side of the diseased joint, *I congratulate myself, as having been the means of ascertaining the salutary effect of this treatment!!*" *P.* 63.

Some other passages of my works are noticed by this unfortunate critic, with similar inconsistency, as I shall take future opportunities of explaining.

It is quite unnecessary to expatiate further on the mode of treating white-swellings complicated with acute inflammation. The most eligible plan of arresting the morbid process in the bones, ligaments, cartilages, and soft parts surrounding the articulation, and the most successful method of lessening the chronic enlargement of the joint, are subjects now demanding our earnest investigation.

The works of Hippocrates, Celsus, Rhazes, Hieron. Fabricius, &c. compared with modern surgical books, will soon convince us, that the practice of the ancients, in the treatment of diseased enlarged joints, does not much differ from the plan now pursued by the best modern surgeons. Mr. Crowther remarks, that the ancients used local and general bloodletting, the actual and potential cautery, with vesicating and stimulating applications to the skin. They further maintained, that sores, produced by these means, should have their discharge promoted, and continued for a considerable length of time.

Topical applications, consisting of strong astringents of the mineral and vegetable kingdom, suffice for the cure of some mild descriptions of white-swellings. A decoction of oak bark, containing alum, is what is recommended for this purpose by Mr. Russell.

My own experience will not allow me to say much in favour of electricity, as an application for the relief of white-swellings. Upon the whole, I must rank electricity among inactive measures; for, though, in a few cases, it has appeared to do good; in others it has done harm, by making the disease more irritable and rapid in its progress; while in most instances, its effects have been so insignificant, as to make it difficult to decide, whether they were of a favourable or an unfavourable nature.

"If the tumour is quite indolent, (says Richerand) the application of galvanism may be proposed; it is not, however, exempt from danger, and on one occasion, where I employed it, lancinating pains and swelling of the joint were brought on by it." (*Nosographie Chirurgicale, tom.* 3. *p.* 174, *Edit.* 2.)

Cases occur, in which a lotion composed of sea-water is productive of benefit. I mean to say, that this application frequently diminishes the enlargement of the joint; but it hardly ever accomplishes a perfect cure.

The conjoined operation of sea-air and sea-bathing has undoubtedly a most powerful influence over scrophulous diseases of the joints, as well as most other strumous disorders; but the application of sea-water alone, in the form of a lotion, cannot be greatly praised, because it prevents the surgeon from having recourse to a better plan of treatment. Even the trial of sea-air and bathing unitedly can only be recommended as an auxiliary plan, to be adopted in conjunction with other more certainly efficacious measures.

Poultices, made of sea-weeds, deserve the same kind of praise as has been given to the sea-water lotion.

Every one is well acquainted with the efficacy of friction in exciting the action of the absorbents. To this principle we are to impute the great benefit, which arises from what is termed, *dry rubbing*, in cases of white-swellings. This kind of friction is performed by the mere hands of an attendant, without using at the same time any kind of liniment, or other application whatsoever, and the rubbing is continued for several hours every day. At Oxford, many poor persons earn their livelihood by devoting themselves to this species of labour, for which they are paid a stipulated sum per hour.

I look upon all mere emollient applications, such as fomentations and poultices, as quite destitute of real efficacy, and, though they serve to amuse the patient, they ought not to be recommended. That surgeon, who merely strives to please his patient's fancy, without doing any real good to him, in regard to his affliction, may be considered as doing harm, because the semblance of something being done too often hinders other really useful steps from being pursued. The French surgeons are particularly liberal in the praises which they bestow on such warm emollient remedies, as poultices, steam of hot water, fomentations, &c. and they adduce instances of white-swellings being cured in this manner. But, whoever has had opportunities of observing the inveterate nature of the disease in this country, will hardly be inclined to recommend the imitation of French practice.

The only method of treatment, which my own personal experience enables me strongly to recommend, consists in keeping up a discharge from the surface of the diseased joint. The opportunities which I have had of observing the effects of blisters, and caustic issues, rather incline me, however, to prefer the former to the latter. I have seen great good derived from both; but more from blisters, than the other kind of issue. There are instances in which I should employ vesicating applications; there are others in which I should prefer making an eschar with caustic. I have seen many instances in which the application of a blister could never be endured, in consequence of the general inflammatory affection, which it occasioned throughout the diseased joint.

The blister should always be large. Many surgeons, instead of following Mr. Crowther's plan, prefer blistering first one side of the joint, and then the other alternately, for a considerable length of time. "Blisters, (says Mr. Latta) may be put upon each side of the patella, and ought to be of such a size and shape, as to cover the whole of the swelling, on the inside, from the hinder part of the joint, at the edge of the hollow of the thigh, to the edge of the patella, over the whole extent of the swelling above and below. As soon as the blister is taken off from one side, it ought to be applied to the other, and thus repeated alternately, until both swelling and pain be completely removed. When this is the case, the patient ought to be directed to rub the joint well with a liniment, composed of half an ounce of camphor, dissolved in two ounces of oil, with the addition of half an ounce of spir. sal-ammon. caust. or, as it is now called, aqua ammoniæ. This is to be used three times a day; and in this way, (continues Mr. Latta) I have successfully treated many cases of white-swellings." (*Syst. of Surgery, Vol.* 1. *chap.* 6.)

In the beginning, caustic issues are even more painful, than blisters; but they afterwards become more like indolent sores, and are more easily kept open, for a length of time, than blisters. Such issues are commonly made on each side of the diseased joint, and of about the size of a half-crown. The manner of making the eschars, and keeping these issues open, is explained, in the article *Issue*.

The question has been contested, among surgical writers and practitioners, whether blisters and issues produce benefit, upon the principle of counter-irritation, or in consequence of the discharge, which

they occasion. They probably operate efficaciously in both ways; for there is no doubt, that mere rubefacients possess the power of rousing the action of the absorbents, and they also may modify the vascular action of diseased parts. These applications can obviously only act upon the principle of counter-irritation, and, they have not been here recommended particularly for white-swellings, because, it seems to me, that whenever some good might be derived from their employment, much more benefit could always be obtained from blisters and issues. This sentiment is confirmed by experience, and we must, therefore, impute a great degree of efficacy to the maintenance of a purulent discharge from the vicinity of the diseased part.

We have noticed the efficacy of friction, in exciting the action of the absorbents, by which the thickened state of parts, around the affected joint, may be considerably lessened, and, on this principle, the utility of dry-rubbing arises. We have now to notice the method of producing the same effect by pressure, a plan, which yet seems to merit a more extensive trial. I have seen in St. Bartholomew's Hospital, a few cases, in which the swelling of the joints was most materially diminished, by encircling the morbid articulations with strips of adhesive plaster, applied with moderate tightness.

A somewhat similar plan, though its modus operandi is differently accounted for, appears also to have been tried in France. "J'ai dans quelques occasions (says Richerand) obtenu les plus grands avantages de l'application d'un taffetas ciré autour de l'articulation tuméfiée. On coupe un morceau de cette étoffe, assez large pour envelopper la totalité de la tumeur; on enduit les bords d'une gomme dissoute dans le vinaigre, et susceptible de le faire adhérer intimement à la peau; on l'applique ensuite de manière que tout l'accès soit interdit à l'air entre lui et les tegumens. Lorsqu'au bout de quelques jours on lève cet appareil, on trouve la peau humide, ramollie par l'humeur de la transpiration condensée en goutelettes à la surface intérieure du taffetas. Dans ce procédé, on établit un espèce de bain de vapeur autour de l'articulation malade. (*Nosographie Chirurgicale, Tom.* 3, *p.* 175, *Edit.* 2.)

My particular friend, Mr. Clement Wilson Cruttwell, of Bath, sent me, some time ago, a very excellent case, illustrative of the efficacy of treatment by pressure. He remarks, that, "After cupping the part, and endeavouring to quiet the inflammation, I used blisters; but they excited such intolerable pain, and produced so great a degree of swelling and inflammation, that I was under the necessity of healing them immediately. After two months strict confinement to bed, and the use of leeches and refrigerant washes, the inflammation having again subsided, and the pain being removed, I again ventured to apply one small blister, and again a similar attack of pain, swelling, and inflammation, was produced. The joint became distended with fluid, of which it had always contained a large quantity, and the irritation of the constitution was excessive. By the liberal use of opium, I once more succeeded in quieting the disturbance, and, convinced of the hazard of using blisters in such a subject, I applied moderate pressure, by means of a roller, together with a wash, containing a large proportion of spirit, in order to keep up a constant evaporation. The skin, which was before much inflamed, and hard, has become natural and flaccid, the pain has ceased, the swelling has diminished, and I have every prospect of effecting a cure, with the preservation of tolerably free motion in the joint."

Mr. Cruttwell tells me, in a late letter; that this case got completely well, by the treatment with pressure, and has remained so for upwards of six months, under full and free exercise.

This example clearly evinces the impropriety of using blisters in certain constitutions. In some remarks, annexed to the above case, Mr. Cruttwell expresses his conviction, that absolute rest, cold applications, and pressure, would succeed in very many cases, without local counter-irritation. Pressure, he adds, succeeds best, when fluid is effused, and the disease is indolent; but, he is convinced that it may be used with advantage in later stages, when abscesses have formed, and sinuses already exist. Mr. Cruttwell, with his usual accuracy of observation, next reminds me, how very serviceable continued pressure is to the scrophulous finger-joints of children.

From what has been stated, I am firmly of opinion, that all impartial practitioners will be disposed to give pressure a more extensive trial, as a means of relieving a disease which too frequently foils every effort of the most skilful surgeon.

We have noticed, that when the knee is affected, there is a great tendency in the limb to become permanently bent. It might undoubtedly be very judicious to oppose the occurrence of this position, by means of splints, which would also serve to prevent all motion of the diseased joint, an object of the very highest importance. Were the disease to end in anchylosis, the advantage of having the

limb in a state of extension need scarcely be mentioned.

Numerous diseased joints are undoubtedly connected with a kind of constitution, called scrophulous. Hence, it seems rational to combine, with the local treatment, the employment of such internal remedies, as have been known to do good in other scrophulous diseases. Hectic symptoms are those, which we commonly have to palliate in these cases. When the appetite is impaired, and the stomach will bear bark, this medicine should be given with the aromatic confection. Above all internal remedies, opium claims the highest recommendation, as it at once tends to keep off and relieve a debilitating diarrhœa, which too frequently prevails, at the same time that it alleviates pain, and procures sleep. The objection, made against its exhibition, on the ground that it increases perspiration, seems exceedingly frivolous, when the above important benefits are taken into consideration.

Too often, however, the terrible disease of which we are now treating baffles all human skill and judgment, and the unhappy patient's health having declined to the lowest state, he is necessitated to submit to amputation, as the only chance of preserving life. It has been explained in the article *Amputation* that the condition of the patient's health, and not of the diseased joint, can form the only solid reason for recurring to the severe operation of removing the limb. If the patient's constitution be equal to a longer struggle, no man can pronounce, that every prospect of saving the limb is at an end. Many diseased joints, apparently in the most hopeless condition, frequently take a favourable turn, and, after all, allow the limb to be saved. The state of the health is the chief consideration, in forming a judgment respecting the propriety of amputation.

The proposal of cutting out diseased joints has been considered in the article *Amputation*.

DISEASE OF THE HIP-JOINT.

This complaint is very analogous in its nature to the white-swelling of other articulations. In the same way, as the latter disorder, it seems probable that the disease of the hip has its varieties, some of which may be connected with scrophula, while others cannot be suspected to have any concern with a strumous habit. The present complaint is most frequently seen attacking children under the age of fourteen; but, no age, no sex, no rank, nor condition of life is exempt from the possibility of being afflicted, so that though children form a large proportion of those subjects, who are attacked; yet the number of adults, and even of old persons, is considerable.

The approach of the disease of the hip-joint is much more insidious, than that of a white-swelling. Severe pains generally precede the latter affection; but, the only forerunner of the former is frequently a slight weakness, and limping of the affected limb. These trivial symptoms are very often not sufficiently urgent to excite much notice, and, when observed by superficial practitioners, are commonly neither understood, nor treated according to the dictates of surgical science. As there is, also, very often an uneasiness in the knee, when the hip is affected, careless practitioners frequently mistake the seat of disease, and I have many times seen patients, on their entrance into an hospital, having a poultice on their knee, while the wrong state of the hip was not at all suspected.

This mistake is extremely detrimental to the patient, not on account of any bad effect, resulting from the applications so applied; but, because it is only in the incipient period of the complaint, that a favourable prognosis can be made. In this stage of the disease, mere rest and repeated topical bleeding, will do more good in the course of a fortnight, than large painful issues will afterwards generally accomplish in the long space of a twelvemonth.

The symptoms of the disease of the hip-joint, when only looked for in the situation of that articulation, are not very obvious to the surgical examiner. Though the attention of the surgeon is, in some instances, soon called to the right situation of the disease, by the existence of a fixed pain behind the trochanter major; yet, it is too often the case, that mere pain about an articulation, entirely destitute of visible enlargement and external alteration of colour, is quite disregarded, as a complaint of no importance in young subjects, and as a mere rheumatic, or gouty affection, in adults. Patients frequently complain of most of their painful sensations being in the groin, and all accurate observers have remarked, that, in the hip-disease, the pain is not confined to the real seat of disease, but shoots down the limb, in the course of the vastus externus muscle to the knee.

The early symptoms of disease in the hip-joint are only strongly delineated to such practitioners, as have acquired the necessary information relative to this part of surgery, from careful study, and extensive experience.

We shall next trace those characters of the present disease, which serve to denote its existence.

It is a curious circumstance, that when

the functions of a limb are obstructed by disease, the bulk of the member generally diminishes, and the muscles become emaciated. Nearly as soon as the least degree of lameness can be perceived, the leg and thigh have actually wasted, and their circumference has become less.

If the surgeon make pressure on the front of the joint, a little on the outside of the femoral artery, after it has descended below the os pubis, great pains will be experienced.

The limping of the patient is a clear proof that something about the limb is wrong, and, if such limping cannot be imputed to diseased vertebræ, or some recent accident, and if, at the same time, the above-mentioned emaciation of the limb exists, there is great cause to suspect, that the hip is diseased, particularly, when the pain is augmented by pressing the front of the acetabulum.

Diseased vertebræ, perhaps, always produce a paralytic affection of both legs at once, and they do not cause painful sensations about the knee, as the hip-disease does.

The increased length of the limb, a symptom that has been noticed by all practitioners since De Haen, is a very remarkable and curious occurrence, in the early stage of the present disease. This symptom is easily detected by a comparison of the condyles of the os femoris, the trochanter major, and malleoli, of the diseased limb, with those parts of the opposite member, taking care that the patient's pelvis is evenly situated. The thing is the more striking, as the increased length of the member is frequently as much as four inches. The rationale of this fact, John Hunter used to explain by the diseased side of the pelvis becoming lower, than the other. (*Crowther, p.* 266.)

The same thing was noticed by Falconer, before Mr. Crowther. (*On Ischias, p.* 9.)

An appearance of elongation of the limb is not exclusively confined to the early stage of the morbus coxarius: it may attend other cases. I remember seeing in one of the wards of St. Bartholomew's Hospital, a little girl, with a diseased knee, whose pelvis was considerably distorted in this manner, so that the limb of the same side appeared much elongated. Her hip-joint was quite sound. This case was pointed out to Mr. Lawrence and myself by Mr. Cother, of Gloucester.

Mr. Ford has very accurately called the attention of surgeons to the alteration, with respect to the natural fulness and convexity of the nates, that part appearing flattened, which is usually most prominent. The gluteus magnus becomes emaciated, and its edge no longer forms so bold a line, as it naturally does at the upper and back part of the thigh, in the sound state of the limb.

Though there may be more pain about the knee, than the hip, at some periods of the malady in its incipient state, yet, the former articulation may be bent and extended, without any increase of uneasiness; but, the os femoris cannot be moved about, without putting the patient to immense torture.

The patient soon gets into the habit of bearing the weight of his body chiefly upon the opposite limb, while the thigh of the affected side is bent a little forward, that the ground may only be partially touched with the foot. This position is found to be the most comfortable, and every attempt to extend the limb occasions an increase of pain.

This is the first stage of the disease, or the one, which is unaccompanied with suppuration.

The symptoms which precede the formation of pus, vary in different cases, according as there is acute, or chronic inflammation present. When the diseased joint is affected with acute inflammation, the surrounding parts become tense and extremely painful; the skin is even reddish; and symptoms of inflammatory fever prevail. When the severity of the pain abates, a swelling occurs in the vicinity of the joint, and a pointing quickly follows.

When the abscess is a chronic one, there is no particular increase of pain preceding the collection of matter.

Startings and catchings during sleep are said to be among the most certain signs of the formation of matter, in this stage of the disease.

We have noticed the lengthened state of the limb, in the first periods of the hip-disease. This condition is not of very long duration, and is sooner, or later succeeded by a shortening of the affected member. The toes are turned inwards; the great trochanter is approximated to the crista of the os ilium; the leg is in a state of flexion; and all the symptoms of a luxation of the thigh upwards and outwards, may be observed, the head of the bone indeed being actually drawn into the external iliac fossa, and carried betwixt the os innominatum and gluteus minimus, which is raised up by it. (See *Richerand's Nosographie Chirurgicale, Tom.* 3, *p.* 171, 172, *Edit.* 2.)

When the retraction is very considerable, it arises from nothing less, than an actual dislocation of the head of the thigh-bone, in consequence of the destruction of the cartilages, ligaments, and articular cavity. This retraction sometimes comes on long before any sup-

puration takes place. The head of the bone is sometimes dislocated, and the disease terminates in anchylosis, without any abscess whatever.

It is worthy of particular notice, that the head of the bone is always luxated upwards and outwards; and the only exception to this observation, upon record, is a case related by the celebrated Italian practitioner Cocchi, in which a spontaneous dislocation of the thigh-bone, as it is termed, happened upwards, forwards, and a little inwards. (See *Levéillés Nouvelle Doctrine Chirurgicale, Tom. 2, p. 595.*) On a également vu la tête du fémur luxée en dedans et en bas, et placée sur le trou obturateur, mais ce mode de déplacement consécutif, dans lequel le membre est alongé, est infiniment rare. (*Richerand, Nosographie Chirurgicale, Tom. 3, p. 172.*)

The hip-disease generally induces hectic symptoms, after it has existed a certain time. In some subjects, such symptoms soon come on; in others, the health remains unaffected a very considerable time.

When abscesses of the above description burst, they continue, in general, to emit an unhealthy thin kind of matter for a long time afterwards.

With respect to the morbid anatomy of the disease in its incipient state, little is known. Two dissections related by Mr. Ford are, perhaps, the only ones throwing light upon this point. In one, there was a tea-spoonful of matter in the cavity of the hip-joint. The head of the thigh-bone was a little inflamed, the capsular ligament a little thickened, and the ligamentum teres united in its natural way to the acetabulum. The cartilage lining the cotyloid cavity was eroded in one place, with a small aperture, through which a probe might be passed, underneath the cartilage, into the internal surface of the os pubis, on one side, and, on the other, into the os ischii; the opposite, or external part of the os innominatum shewing more appearance of disease, than the cotyloid cavity. In the other instance, the disease was more advanced. These examples are important, inasmuch as they prove that the hip-complaint primarily affects the cartilages, ligaments, and bones, and not the surrounding soft parts as De Haen, and some others, would lead one to believe.

As the disorder advances, the portions of the os ischium, os ilium, and os pubis, composing the acetabulum, together with the investing cartilage, and synovial gland, are destroyed. The cartilage covering the head of the os femoris, the ligamentum teres, and capsule of the joint, suffer the same fate, and caries frequently affects not only the adjacent parts of the ossa innominata, but also the head and neck of the thigh-bone. The bones of the pelvis, however, are always more diseased than the thigh-bone, a fact, which displays the absurdity of ever thinking of amputation in these cases. Mr. Ford observes, "In every case of disease of the hip-joint, which has terminated fatally, I have remarked, that the os innominatum has been affected by the caries in a more extensive degree, than the thigh-bone itself." (*Observations on the Disease of the Hip-joint, p. 107.*)

Sometimes, however, the head and neck of the thigh-bone are annihilated, as well as the acetabulum.

External violence; laying down on the damp ground in summer time; and all kinds of exposure to damp and cold; are the causes to which the disease may sometimes be referred. Scrophula, no doubt, has, frequently, some concern in the origin of the malady; but, oftentimes, no rational cause of the complaint can be assigned.

TREATMENT OF THE DISEASE OF THE HIP-JOINT.

Hippocrates, Celsus, Cælius Aurelianus, &c. convince us in their writings, that the ancients treated the present disease much in the same way, as the moderns. Forming an eschar, and keeping the sore open; topical bleeding; cupping; fomenting the part, &c. were all proceedings adopted in the earliest periods of surgery. Drs. Charlton, Oliver, and Falconer, have extolled Bath water, as a most efficacious application to diseased hip-joints, previous to the suppurative stage. However, had not their accounts been exaggerated, all patients of this kind would long ago have flocked to Bath, and the surgeons in other places would never have had further occasion to adopt a more painful mode of treatment.

The plan pursued at Bath, is to put the patient in a warm bath, two or three times a week, for fifteen or twenty-five minutes.

In the early period of the disease, entire rest, the application of fomentations, and the employment of topical bleeding, particularly cupping, are highly proper. Such practice, also, is invariably judicious, whenever the case is attended with symptoms of acute inflammation. When the fomentations are not applied, the lotio aquæ lithargyri acetati may be used.

This method of treatment ought never to be employed, unless there are manifest marks of active inflammation present. When no such state exists, this plan can only be regarded as preventing the adoption of a more efficacious one, and, therefore, censurable.

As far as morbid anatomy can inform

us, the hip-disease consists of the same alteration of the bones, ligaments, and cartilages, as takes place in the majority of white-swellings. Hence, both diseases should be treated on the same principles. *Quibus diuturno dolore*, says Hippocrates, *ischiadico vexatis coxa excidit, iis femur contabescit et claudicant, nisi urantur.* Forming an eschar, or issue, is the most efficacious plan of treating the disease even now known.

A caustic issue seems to me more beneficial than a blister, in cases of diseased hips. The depression, just behind and below the trochanter major, is the situation, in which surgeons usually make the issue, and the size of the eschar should be nearly as large as a crown piece. It is, in general, necessary to keep the issue open a very long time. When the thigh-bone is dislocated, the case mostly ends in anchylosis.

FUNGUS HÆMATODES OF THE HIP-JOINT.

Mr. Burns, in the second volume of his "Dissertations on Inflammation," p. 311, has recorded a remarkable instance, in which this joint was affected with that intractable and fatal distemper, the fungus hæmatodes. The case was at first supposed to be the disease, of which we have just been treating in the preceding section. The limb seemed to be elongated, and issues were employed, without any material benefit. The upper part of the thigh swelled, while the lower wasted away. The patient lost his appetite, had a quick pulse, and passed sleepless nights. The part was rubbed with anodyne balsam, and laudanum given every night; but, these means were only productive of temporary benefit. After some months, a difficulty of making water came on, which ended in a complete retention. It being found impracticable to introduce a catheter, and a large elastic tumour, supposed to be the distended bladder, being felt within the rectum, a trocar was pushed into the swelling. A good deal of bloody fluid was thus discharged. Afterwards a considerable quantity of high-coloured fetid urine continued to escape from the urethra. In about a week from this operation, the patient died.

On dissection, Mr. Burns found the hip-joint completely surrounded with a soft matter, resembling brain, inclosed in thin cells, and here and there other cavities, full of thin bloody water, presented themselves. The acetabulum and head of the os femoris were both carious. The muscles were quite pale, and almost like boiled liver, having lost their fibrous appearance. The same kind of substance was found in the pelvis, and most of the inside of the affected bones carious. Large cells, containing bloody water, were observed in the diseased substance, and it was into one of such cavities, that the trocar had entered, when the attempt was made to tap the bladder. See "*Treatise on the Diseases of the Joints,*" *being the observations for which the prize for* 1806 *was adjudged by the Royal College of Surgeons, London. Ford's Observations on the Disease of the Hip-Joint* are particularly excellent. See also *Crowther on White-Swelling, &c. Edit.* 2, 1808. *Lalta's System of Surgery. B. Bell's Surgery. Falconer on Ischias. Burns on Inflammation, Vol.* 2, *p.* 311. *The authors quoted throughout this article, both ancient and modern, may all be consulted with advantage.*

JUGULAR VEIN, how to bleed in. See *Bleeding*.

K.

KALI ÆRATUM.—℞. Kali præparati ℥ss. Aq. distillatæ ʒv. Ammon. præparatæ ʒj. Dissolve the kali in a water-bath; add the ammonia; and, when the effervescence has ceased, let the fluid crystallize. Two drams are given as a lithontriptic, in a pint of distilled water, twice a day, at St. Bartholomew's Hospital. (*Pharmacopœia Chirurg.*)

KALI ARSENICATUM.—℞. Arsenici albi, Nitri purif., sing. ʒj. Crucibulo amplo igne candenti injice nitrum, et liquefacto adde gradatim arsenicum in frustulis donec vapores nitrosi oriri cessaverint. Solve materiam in aquæ distillatæ libris quatuor, et post idoneam evaporationem sepone ut fiant crystalli.

These crystals may be given in the dose of one-tenth of a grain, thrice a day. (*Pharm. Sancti Barthol.* 1799.) Justamond strongly recommended the internal exhibition of arsenic in cases of cancer. See *Cancer*.

KALI PURUM.—This is one of the most useful caustics for destroying funguses, making issues, in cases of diseased vertebræ, white swellings, &c; and it is recommended to be used in a particular manner, by Mr. Whately, for the cure of strictures in the urethra. When surgeons

prefer opening buboes, or any other abscesses, with caustic, the kali purum is very commonly employed. When surgeons used to cure hydroceles, by destroying a part of the scrotum and tunica vaginalis with caustic, the kali purum, either alone, or mixed with quicklime, was made use of. (See particularly *Vertebræ, Diseased; Urethra, Strictures of*, &c.)

KALI SULPHURATUM. Two drams of this, dissolved in a pint of lime or distilled water, make an excellent lotion for the cure of the tinea capitis. Many other cutaneous affections yield, also, to the same remedy. When arsenic has been swallowed as a poison, it is best to give first, twenty grains of zincum vitriolatum, as an emetic the quickest in its operation; and, after keeping up the vomiting by drinking warm water, and, what is better, sweet oil, it is recommended to make the patient drink as much as possible of a solution of the kali sulphuratum, the sulphur of which is known to blunt the activity of the mineral.

KNEE, DISEASES OF. See *Joints*.

KNEE-CAP, its effects in relieving the inconveniences resulting from cartilaginous substances in the knee. See *Joints*.

L.

LABIA LEPORINA. See *Harelip*.

LAGOPHTHALMIA, OR LAGOPHTHALMOS. (from λαγος, a hare; and οφθαλμος, an eye.) *The Hare's Eye*. A disease, in which the eye cannot be shut. The following complaints may arise from it; a constant weeping of the organ, in consequence of the interruption of the alternate closure and opening of the eye-lids, which motions so materially contribute to propelling the tears into the nose; blindness in a strong light, in consequence of the inability to moderate the rays, which fall on the eye; on the same account, the sight becomes gradually very much weakened; incapacity to sleep where there is any light; irritation, pain, and redness of the eye, from this organ being exposed to the extraneous substances in the atmosphere, without the eye-lids having the power of washing them away, in the natural manner.

An enlargement, or protrusion of the whole eye, or a staphyloma, may obviously produce lagophthalmos. But, affections of the upper eye-lids are the common causes. Heister says, he has seen the complaint originate from a disease of the lower one. Now and then lagophthalmos depends on paralysis of the orbicularis muscle. A cicatrix, after a wound, ulcer, or burn, is the most frequent cause.

When lagophthalmos arises from a paralytic affection of the orbicularis palpebrarum, let the eye-lids be rubbed with the tinctura cantharidum, and cold water, or the linimentum camphoræ. Electricity is also considered as a principal means of cure, (*Chandler*) together with the exhibition of bark, the use of the shower-bath, &c.

When the affection arises from spasm of the levator palpebræ superioris, electricity, a small blister on the neighbouring temple, and rubbing the eye-lid and eye-brow with the tinctura opii, are good means. Internal antispasmodic medicines may also be tried.

When lagophthalmos arises from the contraction of a cicatrix, its relief is to be attempted precisely on the same principles as the ectropium. (See *Ectropium*.) In some cases, it will not be amiss, especially at night, to lay plasters, drawing in contrary directions upon each lid, and to assist them by a compress and bandage. (*Chandler*.)

The inconveniences, depending on the eye being unable to shelter itself from the light, are to be obviated by wearing a green shade, till the disorder is cured.

Whoever is acquainted with German and is desirous of more minute information on this subject, may find an excellent account of lagophthalmos in *Richter's Anfangsgr. der Wundarzn. Band 2. Von dem Hassenauge*. See also *Chandler on the Diseases of the Eye. Chap. 2.*

LARYNGOTOMY. (from λαρυγξ, the larynx; and τεμνω, to cut.) The cutting an opening into the larynx. (See *Bronchotomy*.)

LATERAL OPERATION. One mode of cutting for the stone is so termed. (See *Lithotomy*.)

LENS CRYSTALLINE OPAQUE. (See *Cataract*.)

LENTICULAR. (from *lenticulaire*, doubly convex.) An instrument, contained in every trephining case, and employed for removing the jagged particles of bone from the edge of the perforation, made in the cranium with the trephine. One side of its blade is convex, the other concave; and one of its edges is sharp. On the end of the blade is fixed a little shallow cup, with its concavity towards

the handle of the instrument. This part serves the purposes of receiving the little pieces of bone, when detached, keeping the end of the blade from hurting the dura mater, and, when applied under the margin of the opening, enables the operator to guide the edge of the instrument all round it, with steadiness and security.

LEUCOMA. (from λευκος, white.) Leucoma and albugo are often used synonymously, to denote a white opacity of the cornea. Both of them, as Scarpa remarks, are essentially different from the nebula of the cornea; for, they are not the consequence of chronic ophthalmy, attended with varicose veins, and an effusion of a milky serum into the texture of the delicate continuation of the conjunctiva over the cornea; but, are the result of violent acute ophthalmy. In this state, a dense coagulating lymph is extravasated from the arteries; sometimes superficially, at other times deeply into the substance of the cornea. On other occasions, the disease consists of a firm callous cicatrix on this membrane, the effect of an ulcer, or wound, with loss of substance. The term *albugo*, strictly belongs to the first form of the disease; *leucoma* to the last, more particularly when the opacity occupies the whole, or the chief part, of the cornea.

The recent albugo, remaining after the cure of a severe acute ophthalmy, is of a clear milky colour; but, when of ancient date, it becomes pearl-coloured. Some cases, which have existed a considerable time, do not seem to have any connexion with the vascularity of the cornea; for they continue insulated in the middle of the transparent portion of this membrane, without occasioning the least uneasiness to the patient, the least disturbance of the rest of the eye, or any attempt of the absorbents to remove them.

The recent albugo, provided the organization of the cornea be not destroyed may generally be dispersed by the means employed for the relief of the first and second stages of acute ophthalmy; viz. general and topical blood-letting with internal antiphlogistic medicines, and topical emollients for the first; slightly irritating and corroborant applications for the second. As soon as the inflammation has subsided, the latter should be employed; for, by making the absorbents remove the coagulating lymph, deposited in the cornea, they restore the transparency of this membrane.

But, though this may often be accomplished in the recent state of albugo, it is not so easy to be done, when the long duration of the disease has paralized the absorbents of the affected part of the cornea; or when the deposition of a dense tenacious substance into its intimate texture, has subverted its organization. In one instance, the matter forming the albugo cannot be absorbed; in the other, it leaves the cornea so much injured, after its absorption, that it continues opaque. (*Scarpa.*)

The recent condition of the disease, without disorganization of the structure of the cornea; its occurrence in young subjects, whose absorbents are readily roused by external stimulants; are circumstances very favourable to the cure. The opacity of albugo in children, arising from severe ophthalmy after the small-pox, and remaining insulated in the centre of the transparent cornea, very often disappears in the course of a few months, even without the interference of art. Heister, Langguth, and Richter, have made the same observation. The event can only be imputed to the vigorous action of the lymphatics in children and to the organization of the cornea not being destroyed. To promote this absorption, Scarpa has found the following collyrium a most efficacious one: ℞. *Ammon. muriatæ.* ʒij. *Cupri acetati* gr. iv. *Aquæ Calcis* ℥viij. *Misce.* To be filtered, after standing twenty-four hours.

He praises also this ointment: ℞. *Tutiæ præpar.* ʒj. *Aloes. s. p.* gr. ij. *calomelanos* gr. ij. *Adipis suillæ.* ʒss. *Misce.* And the *unguentum ophthalmicum* of Janin. He mentions the gall of the ox, sheep, pike, and barbel, applied to the cornea, two or three times a day, with a small hair pencil, if too much irritation should not be produced. In some subjects, when the eyes are very irritable, and cannot bear the latter applications, Scarpa has found the oil of walnuts, when rather rancid, very beneficial; two or three drops being insinuated into the eye, every two hours, for some months. In others, he has found the juice of the lesser centaury, mixed with honey, of service.

It is generally necessary to persevere very strictly, for at least three or four months, before the case can be reckoned incurable.

All the expedients, proposed for the inveterate albugo or leucoma from a cicatrix, consisting of scraping or perforating the layers of the cornea, and exciting ulceration there, are unavailing. For, though, the enlargement of the cornea, should be lessened by such means, its diaphanous state could not be restored; or should the patient perceive a ray or two of light immediately after the operation, the benefit would only be transient; for, as soon as the wound had healed, the opacity would recur. The formation of an artificial ulcer might prove useful, did leucoma depend on a mere extravasation of lymph; but, the fact is, the disease arises from the

deposition of an opaque substance, and the disorganization of the texture of the cornea, conjointly; in this lies the difference between albugo and leucoma.

See *Scarpa sulle Malattie degli Occhi. Venezia*; 1802. *Richter's Anfangsgrunde der Wundarzn. Band* 3. *Essays on the Morbid Anatomy of the Eye, by J. Wardrop; Edinb.* 1808: *chap.* 11.

LIGATURE. (from *ligo*, to bind.) In the article *Hemorrhage*, we have noticed, that the immediate effect of a tight ligature on an artery, is to cut through its middle and internal coats, a circumstance, that tends very much to promote the adhesion of the opposite sides of the vessel to each other. Hence, the form and mode of applying a ligature to an artery should be such as are most certain of dividing the above coats of the vessel, in the most favourable manner. A broad flat ligature does not promise to answer this purpose in the best manner; because it is scarcely possible to tie it smoothly round the artery, which is very likely to be thrown into folds, or to be puckered by it, and, consequently, to have an irregular bruised wound made in its middle and internal coats. (*Jones.*) A ligature of an irregular form is likely to cut through these coats more completely at some parts than others; and if it does not perfectly divide them, no adhesion can take place, and secondary hemorrhage will follow. A fear of tying the ligature too tight may often lead to the same consequences. These, and many other important circumstances, are noticed in the article *Hemorrhage*.

Ligatures are commonly made of inkle, waxed together with white wax. They should be round, and very firm, so as to allow being tied with some force, without risk of breaking. (See *Jones on Hemorrhage*, *p.* 172.)

LINIMENT. (from *lino*, to anoint.) A very soft kind of ointment, not much thicker than oil, and intended to be smeared, or rubbed on parts.

We shall only mention here, a few of the most useful ones for surgical purposes.

LINIMENTUM AMMONIÆ FORTIUS.—℞. Aq. ammon. pur. ʒj. Olei olivæ ʒij. Misce. Used for stimulating the surfaces of parts in which it is wished to excite the action of the absorbents. It is serviceable in removing indurations, stiffness of the joints, &c.

LINIMENTUM CALCIS.—℞. Aquæ calcis, Olei olivæ, sing. ʒviij. Spirit. vinosi rectificati ʒj. Misce.—A common application to burns and scalds.

LINIMENTUM CAMPHORÆ COMPOSITUM.—℞. Camph. ʒij. Aq. ammon. ʒvj. Spirit. lavend. ʒxvj. Sixteen ounces are to be distilled of the two last ingredients, from a glass retort, and the camphor then dissolved in the distilled fluid.—For bruises, sprains, rigidities of the joints, incipient chilblains, &c.

LINIMENTUM CAMPHORÆ ÆTHEREUM.—℞. Camphoræ drach. j. Ætheris unc. ss. Olei viperarum drach. ij. Misce. The camphor is to be dissolved in the æther, and the oil afterwards incorporated with it.

This formula, communicated by Mr. Ware, is adapted to those obscure affections of the eye, in which it is not easy to determine, whether the imperfection of the sight proceeds from an incipient cataract, or a defect of sensibility in the optic nerve.

The mode of applying it is to moisten the finger with it, and to rub it for two or three minutes together, morning and evening, on the outside and edges of the eyelids. (*Pharm. Chirurgica.*)

LINIMENTUM HYDRARGYRI COMPOSITUM.—℞. Ung. hydrargyri fortioris, Adipis suillæ, sing. ʒj. Camph. ʒij. Spirit. vinos. rectif. ʒij. Aq. ammon. pur. ʒj.—The camphor being dissolved in the spirit of wine, add the aq. ammon. and the ointment previously blended with hogs lard. (*Pharm. Sancti Barthol.*) A truly excellent formula for all surgical cases, in which the object is to quicken the action of the absorbents, and gently stimulate the surfaces of parts. It is a capital application for diminishing the indurated state of particular muscles, a peculiar affection every now and then met with in practice; and it is particularly well calculated for lessening the stiffness and chronic thickening often noticed in the joints.

LINIMENTUM SAPONIS COMPOSITUM.—℞. Sapon. ʒiij. Camph. ʒj. Spirit. rorismar. ℥j. Dissolve the soap in the spirit, and then add the camphor.—Uses the same as those of the linimentum camph.

LINIMENTUM SAPONIS CUM OPIO. ℞. Lin. sapon. comp. ʒvj. Tinct. opii ʒij. Misce.—For dispersing indurations and swellings attended with pain, but no acute inflammation.

LINIMENTUM TEREBINTHINÆ. ℞. Ung. resinæ flavæ ʒiv. Ol. terebinthinæ, q. s. Misce. The celebrated application for burns, recommended by Kentish. (See *Burns.*)

LINIMENTUM TEREBINTHINÆ VITRIOLICUM.—℞. Olei olivæ ʒx. Ol. terebinth. ʒiv. Acidi vitriol. ʒiij. Misce.—Said to be efficacious in chronic affections of the joints, and in the removal of long existing effects of sprains and bruises.—(*Pharm. Chirurgica.*)

LIP, CANCER OF. The lips are subject to ulcers, which put on a very malignant aspect, although they are not in reality malignant; and many of these, occurring just on the inside of these parts,

will be found to depend on the bad state of the constitution, and the irritation and disturbance which the sores are continually suffering from the incessant motion of the parts, and their rubbing against a projecting, or rough tooth.

When cancer takes place, it is usually in the lower, and very seldom in the upper lip.

The disease sometimes puts on the appearance of an ulcerated, wart-like excrescence, occasionally acquiring a considerable size. Sometimes it is seen in the form of a very destructive ulcer, which consumes the surrounding substance of the lip; and, in other examples, the disease resembles a hard lump, which, at length, ulcerates. The disease, in its infancy, is often no more than a pimple, which gradually becomes malignant. Whenever there is reason to believe, that the disease is of an unyielding cancerous nature, the sooner it is extirpated the better. For this purpose, some surgeons admit the propriety of using caustic, when the whole disease can be completely destroyed by one application. But, as the action of caustic is not capable of being regulated with so much precision as the extent of a wound can be, and as caustic will not allow the parts to be united again, the knife is the only justifiable means, especially as it occasions also less pain. Two incisions are to be made, meeting at an angle below, (supposing it to be the lower lip) and including the whole of the disease. The sides of the wound are then to be united with the twisted suture. (See *Hare-lip*.) When the affection is extensive, however, the surgeon is frequently necessitated to remove the whole of the lip, or too much of it to admit of the above plan being followed. This circumstance is particularly unpleasant, as the patient's spittle can only be prevented from continually running over his chin by some artificial contrivance. The deformity also is very great, and pronunciation and swallowing can only be imperfectly performed.

LIPPITUDO. (from *lippus*, blear-eyed.) *Bleariedness*. The ciliary glands, and lining of the eyelids, only secrete, in the sound state, a mere sufficiency of a sebaceous fluid to lubricate the parts in their continual motions. But, it sometimes happens, from disease, that this sebaceous matter is secreted in too great a quantity, and glues the eye-lids together during sleep, so that, on waking, they cannot be easily separated. Hence, the margin of the eye-lids becomes red all round, and the sight itself even weakened.

The best remedies are the unguentum hydrargyri nitrati, smeared, at night, on the edges and inside of the eye-lid with a hair pencil, after being melted in a spoon; the unguentum tutiæ, applied in the same way; and a collyrium, composed of ℈j. of zincum vitriolatum in ℥viij. of aquæ rosæ.

When alterative medicines are requisite, a grain of calomel may be exhibited daily, or a pill containing one grain of calomel, one of sulphur antimonii præcipitatum, and two of guaiacum, put together with soap.

Persons who have lippitudo and cataracts together, bear couching much better, than one would expect from the appearance of the eyes in that disease; and Mr. Hey never rejects a patient on this account, provided such state is habitual. (*Practical Observations*, p. 51.) Scarpa, however, recommends relieving the lippitudo before undertaking the operation, as we have explained in the article *Cataract*.

See *Chandler on the diseases of the Eyes*, chap. 8. *Scarpa sulle Malattie degli Occhi*, p. 244.

LITHONTRIPTICS. (from λιθος, a stone; and θρυπτω, to break.) Medicines for dissolving stones in the bladder. (See *Urinary Calculi*.)

LITHOTOMY. (from λιθος, a stone; and τεμνω, to cut.) The operation of cutting into the bladder, in order to extract a stone.

It has been correctly remarked, that no single operation of surgery has attracted so much notice, or had so much written upon it, as that of lithotomy. A full and minute account of the sentiments of every writer, who has treated of the subject, and a detail of the infinite variety of particular modes of making an opening into the bladder, would occupy as many pages as are allotted to the whole of this dictionary. It must be my endeavour, therefore, rather to describe what is most interesting and important, than pretend to offer an article which is to comprehend every thing.

May I be allowed to premise, that throughout the following columns, I suppose the reader well informed of all that relates to the anatomy of the bladder and adjacent parts, and of the perineum. Without correct knowledge of this kind, a man must be presumptuous, indeed! who will set himself up for a good lithotomist; and if he distinguishes himself at all, it will only be by the murders, which he commits, while his successful feats, if he achieve any at all, will redound little to his honor, since every young student will soon find out, that they are not the effect of science, but of mechanical habit and imitation. I would particularly recommend every one, who would wish to become well acquainted with the anatomy of the pelvic viscera and perinæum, with a view to lithotomy, in the first place to dissect these parts himself, and then avail himself of the valuable instructions to be derived on the subject from Winslow's Anatomy; LeDran's Parallèle des Tailles; Heister's Instit. Chirurg.; Le Cat's

Deuxième Recueil, planche 5 et 6; Haller's Inst. Med. of Boerhave, and Elem. Physiol. Tom. 5; Morgagni, Adversar. Anat. 3, p. 82, 97: Camper's plates; Sabatier's Anatomy; John Bell's Principles of Surgery; Deschamp's Traité Historique, &c. de l'Opération de la Taille, Tom. 1, p. 7, &c.

A few subjects, which are closely connected with the present, will be found in other parts of this dictionary. For instance, the nature of stones in the bladder will be considered under the head of *Urinary Calculi*, where also will be seen some observations on lithontriptics. The manner of searching for the stone, or as it is now more commonly expressed, of sounding, will be explained in the article *Sounding*.

Here I shall principally confine myself to the symptoms of the disease, and the chief methods of executing the much diversified operation of lithotomy.

SYMPTOMS OF THE STONE.

The symptoms of a stone in the bladder are, a sort of itching along the penis, particularly at the extremity of the glans; and hence the patient frequently gets a habit of pulling the prepuce, which becomes elongated; frequent propensities to make water, and go to stool; great pain in voiding the urine, and difficulty of retaining it, and often of keeping the feces from being discharged at the same time; the stream of urine is liable to stop suddenly, while flowing in a full current, although the bladder is not empty, so that the fluid is expelled by fits, as it were; the pain is greatest towards the end of, and just after, the evacuation; there is a dull pain about the neck of the bladder, together with a sense of weight, or pressure, at the lower part of the pelvis; and a large quantity of mucus is mixed with the urine; and, sometimes, the latter is tinged with blood, especially, after exercise. (*Sharp, Earle, Sabatier.*)

Frequently (says Deschamps) a patient will have a stone in his bladder a long while without the occurrence being indicated by any symptom, or accident. Most commonly, however, the presence of the stone is announced by pain in the kidneys, more especially in adults and old persons, children scarcely ever suffering in this way, because in them the stone is hardly at all detained in the kidneys and ureters, but descends immediately into the bladder, the preceding tubes being in them more dilatable, and the rudiment, or nucleus of the stone smaller.

It seldom happens, that calculous patients void blood with their urine, before the symptoms and accidents, usually caused by the stone, have taken place. It is not till after the foreign body has descended into the bladder, acquired some size, and presented itself at the orifice of that viscus, that pain is occasioned, particularly, when the surface of the stone is unequal. The patient then experiences frequent inclination to make water, attended with pain. The jolting of a carriage, riding on horseback, and much walking, render the pain more acute. The urine appears bloody, and its course is frequently interrupted, and sabulous matter and particles of stone are sometimes discharged with it. The want to make water becomes more frequent and more insupportable. The bladder is irritated, and inflames; its parietes become thickened and indurated; and its diameter is lessened. A viscid more or less tenacious matter is observed, in greater or lesser quantity, in the urine, and is precipitated to the bottom of the vessel. The urine becomes black and putrid, and exhales an intolerable alkalescent smell which is perceived at the very moment of the evacuation, and is much stronger a little while afterwards. The patient can no longer use any exercise, without all his complaints being redoubled. Whenever he walks in the least, the urine becomes bloody; the pain about the hypocondria, which was dull in the beginning, grows more and more acute; the ureters and kidneys participate in the irritation with the bladder; they inflame and suppurate, and very soon the urine brings away with it purulent matter. The fever increases, and changes into one of a slow type; the patient loses his sleep and appetite; becomes emaciated and exhausted; and death at length puts a period to his misery. (See *Traité Historique et Dogmatique de l'Operation de la Taille par J. F. L. Deschamps, Tom.* 1, *p.* 163; *Paris*, 1796.)

It is acknowledged by all the most experienced surgeons, and judicious writers upon the present subject, that the symptoms of a stone in the bladder are exceedingly equivocal, and may be produced by several other disorders. "Pain in making water, and not being able to discharge the urine without the feces, are common consequences of irritation of parts about the neck of the bladder, from a diseased prostate gland, and other causes. The urine stopping in a full stream is frequently caused by a stone altering its situation, so as to obstruct the passage; but the same thing may happen from a tumour, or fungus in the bladder. I have seen an instance of this, where a tumour, hanging by a small pedicle, would sometimes cause obstruction, and by altering the posture, would retire, and give a free passage. The dull pain at the neck of the bladder, and the sensation of pressure on the rec-

tum, are frequently owing to the weight of the stone, &c.; but these may proceed from a diseased enlargement of the prostate gland. Children generally, and grown persons frequently, are subject to a prolapsus ani, from the irritation of a stone in the bladder; but it will likewise be produced by any irritation in those parts." (*Earle.*) The rest of the symptoms are equally fallacious; a scirrhous enlargement of the os tincæ, and disease of the kidneys, may occasion a copious quantity of mucus in the urine, with pain, irritation, &c. "The least fallible sign (says Sir James Earle) which I have remarked, is the patient making the first portion of urine with ease, and complaining of great pain coming on when the last drops are expelled. This may readily be accounted for, from the bladder being at first defended from contact with the stone by the urine; and, at last, being pressed naked against it. But, to put the matter out of all doubt, and actually to prove the existence of a stone in the bladder, we must have recourse to the operation of sounding."

A stone in the ureter, or kidneys, or an inflammation in the bladder, from any other cause, will sometimes produce the same effects; but if the patient cannot urine, except in a certain posture, it is almost a sure sign the orifice is obstructed by a stone. If he finds ease by pressing against the perinæum with his fingers, or sitting with that part upon a hard body, there is little doubt the ease is procured by taking off the weight of the stone; or, lastly, if, with the other symptoms, he thinks he can feel it roll in his bladder, it is hardly possible to be mistaken; however, the only sure judgment is to be formed from searching. (*Sharp on the Operations.*)

An enlarged prostate gland is attended with symptoms resembling those of a stone in the bladder; but, with this difference, that the motion of a coach, or horse, does not increase the grievances, when the prostate is affected, while it does so in an intolerable degree in cases of stone. It also generally happens, that the fits of the stone come on at intervals; whereas, the pain from a diseased prostate is neither so unequal, nor so acute.—(*Sharp in Critical Enquiry, p.* 165, *Edit.* 4.)

Though, from a consideration of all the circumstances above related, the surgeon may form a *probable* opinion of there being a stone in the bladder, yet he must never presume to deliver a *positive* one, nor ever be so rash as to undertake lithotomy, without having greater reason for being certain that there is a stone to be extracted. Indeed, all prudent surgeons, for centuries past, have laid it down as an invariable maxim, never to deliver a decisive judgment, nor undertake lithotomy, without having previously introduced a metallic instrument, called a sound, into the bladder, and plainly felt the stone.

However, were the symptoms most unequivocal, there is one circumstance which would always render it satisfactory to touch the stone with an instrument, *just before* venturing to operate; I mean the possibility of there actually being a stone in the bladder to-day, and *not to-morrow*. It is now a well-known fact, that stones are occasionally forced, by the violent contractions of the bladder, during fits of the complaint, between the fasciculi of the muscular coat of this viscus, together with a portion of the membranous lining of the part, so as to become what is termed encysted. The opening into the cyst is frequently very narrow, so that the stone is much bigger, than the orifice of the cyst, in consequence of which it is impossible to lay hold of the extraneous body with the forceps, and the operation would necessarily become fruitless. (*Sharp's Critical Enquiry, p.* 228, *Edit.* 4.)

In the article *Urinary Calculi*, I have noticed the probability of this having occurred in some of the instances, in which Mrs. Stevens's medicine was supposed to have actually dissolved the stone in the bladder; for, an encysted stone is not likely to be hit with the sound, nor to cause any inconvenience, compared with what a calculus, rolling about in the bladder, usually occasions.

It is noticed by Deschamps, that when the stone is lodged in an excavated corner of the bladder, in a particular cyst, or depression; when it projects but very little; when it cannot shift its situation in the bladder, so as to fall against the orifice of this viscus; and when it is also smooth, polished, and light; the patient may then have it a long while, without experiencing any afflicting symptoms. He may even live to an advanced age, if not without some degree of suffering, at most with such pain as is very supportable. Daily experience proves, that persons may live a considerable time, with one, two, or even three stones in the bladder, and, during the whole of their lives, have not the least suspicion of the existence of these foreign bodies.

According to Deschamps, this must have been the case of M. Portalieu, a taylor in the street Sepulchre. This individual, eighty years old, was frequently attacked with a retention of urine from paralysis, and had consulted Deschamps two years previously. This surgeon introduced a sound several times, and distinctly felt a stone in the bladder. The patient, however, never had any symptom of the disorder, not even up to the period

when Deschamps was writing down the case in his excellent treatise. Very large and exceedingly rough stones have also been found in the dead bodies of certain persons, who had never complained of the symptoms of the disease. But, cases of this kind must be extremely rare, because it is well known, that the pain, which a stone produces, is less in a ratio to its size, than to its shape and situation. A small stone, owing to its situation, may be more painful, than an enormous calculus, which fills the bladder, as is proved by the following case, cited by Deschamps.

Pochet, a watchmaker, until the age of 45, had never had any infirmity, except that of not being able to retain his water a long while. One day, while he was carrying a very heavy pendulum, he made some exertion, which, probably by changing the situation of the calculus, caused at the instant an acute pain in the hypogastric region. Symptoms of the stone soon came on; the pain became intolerable; and the patient went into the Hôpital de la Charité. He was sounded; the stone was felt, and judged to be of considerable size. The incision in the neck of the bladder not sufficing for its extraction, the patient was put to bed again. The next morning, he was operated upon above the pubes by Frère Come, who extracted an oval calculus, that weighed twenty-four ounces. The patient died four and twenty hours after this second operation. This case proves then, that very large stones may lie a long while in the bladder without occasioning any serious complaints, since the preceding patient apparently had such a calculus a long time, without suffering inconvenience from it, and it seems likely, that he might have continued well still longer, had it not been for the accidental effort, which first excited the symptoms. (*Deschamps, in Traité Historique, &c. de la Taille, Tom.* 1, *p.* 166, 167.)

With perfect impartiality, I shall next concisely describe the various methods of cutting for the stone, beginning with the most ancient, called the *apparatus minor*, and ending with the modern proposal of employing a knife in preference to a gorget.

OF THE APPARATUS MINOR, CUTTING ON THE GRIPE, OR CELSUS'S METHOD.

The most ancient kind of lithotomy was that practised upwards of two thousand years ago, by Ammonius, at Alexandria, in the time of Herophilus and Erasistratus, and by Meges, at Rome, during the reign of Augustus; and, being described by Celsus, is named, *Lithotomia Celsiana*. From cutting directly on the stone, fixed by the pressure of the fingers in the anus, it has been called, *cutting on the gripe*, a knife and a hook being the only instruments used. The appellation of the *lesser apparatus*, was given to it by Marianus, to distinguish it from a method which he described, called the *apparatus major*, from the many instruments employed.

The operation was done in the following way. The rectum was emptied by a glyster, a few hours previously; and, immediately before cutting, the patient was desired to walk about his chamber, to bring the stone down to the neck of the bladder; he was then placed in the lap of an assistant, or secured as now, in the lateral operation. The surgeon then introduced the fore and middle fingers of his left hand, well oiled, into the anus; while he, at the same time, pressed with the palm of his right hand on the lower part of the abdomen, above the pubes, to assist in bringing down the stone. With the fingers, it is next to be griped, pushed forward toward the neck of the bladder, made to protrude, and form a tumour on the left side of the perinæum. The operator then took a scalpel, and made a lunated incision through the skin and cellular substance, directly on the stone, and near the anus, down to the neck of the bladder, with the horns towards the hips. Then, in the deeper and narrower part of the wound, is to be made a second incision, also transverse, into the neck of the bladder itself, till the flowing out of the urine shews the incision to exceed, in some degree, the size of the stone. The calculus, being strongly pressed upon with the fingers, next started out of itself, or was extracted with a hook for the purpose. (*Celsus, lib.* 7, *cap.* 26. *J. Bell's Principles, Vol.* 2, *p.* 42. *Allan on Lithotomy*, *p.* 10.)

The objections to cutting on the gripe, are, the impossibility of always dividing the same parts; for, those which are cut will vary, according to the degree of force employed in making the stone project in the perinæum. When little exertion is made, if the incision be begun just behind the scrotum, the urethra may be altogether detached from the prostate; if the stone be much pushed out, the bladder may be entered beyond the prostate, and both the vesiculæ seminales and vasa deferentia inevitably suffer. Lastly, if the parts are just sufficiently protruded, the bladder will be cut upon its neck, through the substance of the prostate gland. (*Allan on Lithotomy. Burns, in Edinburgh Surgical Journal, No. XIII. J. Bell, Vol.* 2, *p.* 59.)

The preceding dangers were known to Fabricius Hildanus, who attempted to obviate them by cutting on a staff, introduced along the urethra into the bladder. He began his incision in the perinæum, about half an inch on the side of the raphe; and he continued the cut, inclining the knife, as he proceeded, towards the hip. He continued to divide the parts till he reached the staff; after which, he enlarged the wound to such an extent, as to permit him easily to extract the stone, which he had previously brought into the neck of the bladder, by pressure with the fingers in the rectum. He employed a hook to extract the stone. (*Burns.*) In this way Mr. C. Bell has operated with success. (*J. Bell.*)

The apparatus minor, as practised by Fabricius, with the aid of a staff, is certainly so simple and safe an operation for children, that we must lament its present utter neglected state. You cut, says an eminent writer, upon the stone, and cut of course, with perfect security, an incision exactly proportioned to its size. There is no difficult nor dangerous dissection; no gorget, nor other dangerous instrument, thrust into the bladder, with the risk of its passing betwixt that and the rectum; you are performing, expressly, the lateral incision of Raw and Cheselden, in the most simple and favourable way. (*J. Bell.*) The *prisca simplicitas instrumentorum* seems, indeed, as the latter gentleman remarks, to have been forsaken, for the sake of inventing more ingenious and complicated operations.

Celsus has delivered one memorable precept in his description of lithotomy, *ut plaga paulo major, quàm calculus sit;* and he seems to have known very well, that there was more danger from lacerating, than cutting the parts.

The simplicity of the operation emboldened every quack to undertake its performance; and thus, by diminishing the emolument of regular practitioners, became the grand cause of its downfall. (See *Heister on this subject.*) It was longer practised, however, than all the other methods; and was performed at Bourdeaux, Paris, and other places in France, on patients of all ages, by Raoux, even as late as 140 years ago. Frere Jacques occasionally had recourse to it; and it was successfully executed by Heister. (*Part 2, chap.* 140.) A modern author recommends it always to be preferred on boys, under fourteen. (*Allan, p.* 12.)

APPARATUS MAJOR,

So named from the multiplicity of instruments employed; or the Marian method, from having been first published by Marianus Sanctus, in 1524, as the invention of his master, Johannes de Romanis. (See *Marianus de lapide Vesicæ per incisionem extrahendo.*)

This operation, which came into vogue, as we have noticed, from avaricious causes, was rude and painful in its performance, and very fatal in its consequences. The apology for its introduction, was the declaration of Hippocrates, that *wounds of membranous parts are mortal.* It was contended, however, that such parts might be dilated with impunity; and, on this principle of dilatation, Romanis invented a complex and dangerous plan of operating; one very incompetent to fulfil the end proposed; one, which, though supposed only to dilate, really lacerated the parts. (*Burns.*)

The operator, kneeling on one knee, made an incision, with his razor, along the perinæum, on one side of the raphe; and, feeling with his little finger for the curve of the staff, he opened the membranous part of the urethra; and, fixing the point of the knife in the groove of his staff, gave it to an assistant to hold, while he passed a probe along the knife into the groove of the staff, and thus into the bladder. The urine now flowed out, and the staff was withdrawn. The operator next took two conductors, a sort of strong iron probes; one, named the female conductor, having in it a groove, like one of our common directors; the other, the male conductor, having a probe point, corresponding with that groove. The grooved, or female conductor, being introduced along the probe into the bladder, the probe was withdrawn, and the male conductor passed along the groove of the female one, into the bladder. Then commenced the operation of dilating. The lithotomist took a conductor in each hand, and, by making their shafts diverge, dilated, or, in plain language, tore open the prostate gland. (*J. Bell.*)

It would be absurd in us to trace the various dilating instruments, contrived for the improvement of this barbarous operation, by the Collots, Le Dran, Paré, &c. Among the numerous glaring objections to the apparatus major, we need only notice the cutting the bulb of the urethra, not dividing the membranous part of the urethra, nor the transversalis perinei muscle, which forms a kind of bar across the place where the stone should be extracted; the laceration of the neck of the bladder; frequent impotency afterwards, and extensive fatality.—Paré, Le Dran, Le Cat, Mery, Morand, Mareschal, Raw, and all the best surgeons in Europe, most strangely practised this rash method, for two hundred years, till Frere Jacques, in 1697, taught at Paris

the original model of lithotomy, as commonly adopted at the present day.

OF THE HIGH OPERATION.

This method of cutting for the stone was first published in 1561, by Pierre Franco, who, in his Treatise on Hernia, says he once performed it on a child, with very good success, but discourages the farther practice of it. After him, Rossetus recommended it, with great zeal, in his book intitled *Partus Cæsarius*, printed in 1591; but he never performed the operation himself.--Monsieur Tolet makes mention of its having been tried in the Hôtel-Dieu, but without entering into the particular causes of its discontinuance, says only, that it was found inconvenient. About the year 1719, it was first done in England, by Mr. Douglas; and after him, practised by others. (*Sharp's Operations.*)

The patient being laid on a square table, with his legs hanging off, and fastened to the sides of it by a ligature, passed above the knee, his head and body lifted up a little by pillows, so as to relax the abdominal muscles, and his hands held steady by some assistants; inject through a catheter, into the bladder, as much barley-water as he can bear, which, in a man, is often about eight ounces, and sometimes twelve.

The bladder being filled, an assistant, in order to prevent the reflux of the water, must grasp the penis, the moment the catheter is withdrawn, holding it on one side, in such a manner as not to stretch the skin of the abdomen; then, with a round-edged knife, make an incision about four inches long, between the recti and pyramidal muscles, through the membrana adiposa, as deep as the bladder, bringing its extremity almost down to the penis; after this, taking a crooked knife, continue the incision into the bladder, carrying it a little under the os pubis; and immediately upon the water's flowing out, introduce the fore-finger of your left hand, which will direct the forceps to the stone. (*Sharp's Operations.*)

Although this is one of the easiest, and, to all appearance, the safest method of operating, several objections soon brought it into disuse. 1. The irritation of a stone often causes such a thickened and contracted state of the bladder, that this viscus will not admit of being distended so as to rise above the pubes. 2. If the operator should break the stone, the fragments cannot be easily washed away, and remaining behind would form a nucleus for a future stone. 3. The urine may become extravasated. 4. The danger of exciting inflammation of the peritonæum. 5. The injection itself is exceedingly painful, and, however slow the fluid be injected, the bladder can seldom be dilated enough to make the operation absolutely secure; and, when hastily dilated, it is sometimes even burst, or, at least, its tone destroyed. We need not enumerate other inconveniences. (See *Sharp, Allan,* &c.)

Some of the objections, however, do not apply to certain instances. In many men, we know by searching, that their bladder is very large, so that we can run no risk of meeting with it in a contracted state, and, therefore, the objection is of no weight, when we are certain, that the bladder extends itself a considerable way above the pubes, and will admit a large quantity of injection. Stones are sometimes known to be of large size, and they are less likely to be broken in this, than any other kind of lithotomy, so that the objection of the difficulty of extracting small ones and fragments, is less forcible. The excoriations, from the effusion of urine all over the skin near the wound, may be prevented by embrocations, ointments, &c. The abscesses and gangrenes, arising from the extravasation of urine in the cellular substance, may be very much prevented by the introduction of a cannula, as practised in the puncture of the bladder above the os pubis. (*Sharp in Critical Enquiry.*)

This celebrated surgeon remarks, in the same chap. 1, that he should not be surprised, if hereafter, on particular occasions, the high operation should be revived and practised with success.

LATERAL OPERATION.

So named from the prostate gland, and neck of the bladder, being laterally cut.

It was invented by an ecclesiastic, who called himself Frere Jacques: he came to Paris in 1697, bringing with him abundance of certificates of his dexterity in operating; and making his history known to the court and magistrates of the city, he got an order to cut at the Hôtel-Dieu, and the Charitè, where he performed this operation on about fifty persons. His success did not answer the promises he had made, and from that time his reputation seems to have declined in the world, if we may give credit to Dionis, who has furnished us with these particulars.—(*Sharp's Operations.*)

Frere Jacques used a big round staff without a groove, and when it was introduced into the bladder, he depressed its handle, with an intention of making the portion of this viscus, which he wished to cut, approach the perinæum. He then plunged a long dagger shaped knife into the left hip, near the tuber ischii, two

fingers breadth from the perinæum, and pushing it towards the bladder, opened it in its body, or as near the neck as he could, directing his incision upward from the anus. He never withdrew his knife, till a sufficient opening was made for the extraction of the stone. He used sometimes a conductor to guide the forceps, but more commonly, directed them with his finger, which he passed into the wound after withdrawing the knife. When he had got hold of the stone, he used to draw it out in a quick rough manner, heedless of the bad consequences. His only object was to get the stone extracted, and he disregarded every thing else; all preparatory means, all dressings, all after treatment. (*Allan, p.* 23.)

Totally ignorant of anatomy, and thus rude and indiscriminate in practice, Frere Jacques soon sunk into disrepute. However, there were several eminent surgeons, who conceived, from considering the parts, which he cut, that his method might be converted into a most useful operation. (*Sharp's Operations.*)

The principal defect, in his first manner of cutting, was the want of a groove in his staff, which made it difficult to carry the knife into the bladder. At length, Frere Jacques was prevailed upon to study anatomy, by which his judgment being improved, he readily embraced several improvements, which were suggested to him. Indeed, we are informed, that he now succeeded better, and knew more, than is generally imagined. Mr. Sharp says, that when he himself was in France in 1702, he saw a pamphlet, published by this celebrated character, in which his method of operating appeared so much improved, that it scarcely differed from the practice of that time. Frere Jacques had learnt the necessity of dressing the wound after the operation, and had profited so much from the criticisms of Mery, Fagon, Felix, and Hunauld, that he then used a staff with a groove, and, what is more extraordinary, had cut thirty-eight patients successively, without losing one. (*Sharp's Operations.*)

In short, as a modern writer has observed, he lost fewer patients, than we do at the present day, in operating with a gorget. He is said to have cut nearly 5000 patients in the course of his life, and, though persecuted by the regular lithotomists, he was imitated by Mareschal at Paris, Raw in Holland, and by Bamber and Cheselden in England, where his operation was perfected.—(*Allan.*)

For a particular history of Frere Jacques, and his operations, Allan refers us to *Bussiere's Letter to Sir Hans Sloane, Philos. Trans.* 1699. *Observations sur la Maniere de tailler dans les deux Sexes, pour l'Extraction de la Pierre, pratiquée par F. Jacques, par J. Mery. Lister's Journey to Paris in* 1698. *Cours d' Operations de Chirurgie, par Dionis. Garengeot's Traité des Operations, Tom.* 2. *Morand, Opuscules de Chirurgie, Part* 2.

Among the many, who saw Frere Jacques operate, was the famous Professor Raw, who carried his method into Holland, and practised it with amazing success. He never published any account of it himself, though he admitted several to his operations; but, after his death, his successor Albinus, gave the world a very circumstantial detail of all the processes, and mentions, as one of Raw's improvements, that he used to open the bladder, between the neck and the ureter. But, either Albinus, in his relation, or Raw himself in his supposition, was mistaken; since it is almost impossible to cut the bladder in that part upon the common staff, without also wounding the neck. (*Sharp in Operations, and Critical Enquiry.*)

Raw's method was objectionable, even when accomplished, as the urine could not readily escape, and became extravasated around the rectum, so as to produce terrible mischief. There is little doubt, that Raw's really successful plan, was only imitative of Frere Jacques's second improved one, though he had not the honour to confess it. (See *Verhius de Calculo Vesicæ.*)

Dr. Bamber was the first man in England, who made a trial of Raw's method on the living subject, which he did in St. Bartholomew's Hospital. Cheselden, who had been in the habit of practising the high operation, gladly abandoned it, on receiving the account of Raw's plan and success, and, a few days after Bamber, he began to cut in this way in St. Thomas's Hospital.

Cheselden used at first to operate in the following manner. The patient being placed, and tied much in the same way, as is done at this day, the operator introduces a hollow grooved steel catheter into the bladder, and with a syringe, mounted with an ox's ureter, injects as much warm water into it, as the patient can bear without pain. The water being kept from running out by a slip of flannel tied round the penis, the end of the catheter is to be held by an assistant, whose principal care is to keep it from rising, but not at all to direct the groove to the place, where the incision is to be made.

With a pointed convex-edged knife, the operator beginning about an inch above the anus, on the left side of the raphe, between the accelerator urinæ, and erector penis, makes an incision downwards, by the side of the sphincter ani, a little obliquely outwards as it descends,

from two and a half to four inches in length, according to the age of the patient, or size and structure of the parts. This incision, he endeavours to make all at one stroke, so as to cut through the skin, fat, and all, or part, of the levator ani, which lies in his way. This done, he passes his left forefinger into the middle of the wound, in order to press the rectum to one side, that it may be in less danger of being cut; and taking a crooked knife in his other hand, with the edge on the concave side, he thrusts the point of it through the wound, close by his finger, into the bladder, between the vesicula seminalis and os ischium of the same side. This second incision is continued upwards, till the point of the knife comes out at the upper part of the first. The incision being completed, the operator passes his left fore-finger through the wound into the bladder, and having felt, and secured the stone, he introduces the forceps, pulls out his finger, and extracts the stone.

As the bladder was distended, Cheselden thought it unnecessary to cut on the groove of the staff, and that, as this viscus was sufficiently pressed down by the instrument, the forceps could be very well introduced, without the use of any director, except the finger. (*Postscript to Douglas's History of the Lateral Operation.* 1726.)

With respect to this first of Cheselden's plans, Sharp says, the operations were exceedingly dexterous; but the wound of the bladder retiring back, when it was empty, did not leave a ready issue for the urine, which, insinuating itself among the neighbouring muscles and cellular substance, destroyed four of the ten that he practised it upon, and some of the others narrowly escaped. (*Sharp's Operations.*)

Cheselden, finding that he lost so many of his patients, in imitating Raw, as Albinus directed, began to adopt a new manner of operating, founded on the anatomy of the parts, which he thus describes: "I first make as long an incision as I well can, beginning near the place, where the old operation ends, and cutting down between the musculus accelerator urinæ and erector penis, and by the side of the intestinum rectum: I then feel for the staff, and cut upon it the length of the prostate gland straight on to the bladder, holding down the gut all the while with one, or two fingers of my left hand." (*Anatomy of the Human Body, Edit.* 1730.)

It deserves to be remarked, it was Cheselden's second manner of cutting, that has been described in the *Opuscules de Chirurgie* of M. Morand, who was deputed, and had his expences defrayed, by the Royal Academy of Sciences in Paris, to come over to England, and learn from Mr. Cheselden himself, his way of operating for the stone; and, accordingly we find, that most French authors, taking their account from M. Morand, describe Mr. Cheselden's second, not his third operation, as that which he invented, and bears his name. But, that Mr. Cheselden never resumed his second manner of cutting, may be presumed from his continuing to describe the third only in all the editions of his anatomy publishe dfter 1730. (*See a note by J. Thomson, M.D. annexed to his new edition of Douglas's Appendix. Edinburgh*, 1808.)

The instruments, which Cheselden employed in his third, and most improved, mode of cutting for the stone, were a staff, an incision knife, a gorget, a pair of forceps, and a crooked needle carrying a waxed thread. The patient being placed on a table, his wrists are brought down to the outsides of his ankles, and secured there by proper bandages, his knees having first been bent, and his heels brought back near his buttocks.

Mr. Cheselden used then to take a catheter, first dipped in oil, and introduce it into the bladder, where having searched for, and discovered the stone, he used to give the instrument to one of his colleagues, whom he desired to satisfy himself, whether there be a stone, or not. The assistant, standing on his right hand, held the handle of the staff between his fingers and thumb, inclined it a little towards the patient's right thigh, and drew the convex side close up to the os pubis, in order to remove the urethra as far as possible from the rectum.

The groove of the staff being thus turned outwardly and laterally, Cheselden used to sit down in a low chair, and, keeping the skin of the perinæum steady with the thumb and forefinger of his left hand, he made the first, or outward incision, through the integuments, from above downwards, beginning on the left side of the raphe, between the scrotum and verge of the anus, almost as high up as where the skin of the perinæum begins to form the bag containing the testicles. Thence, he continued the wound obliquely outwards, as low down as the middle of the margin of the anus, at about half an inch distant from it near the skin, and, consequently, beyond the tuberosity of the ischium. He was always careful to make this outward wound as large as he could with safety. Having cut the fat rather deeply, especially near the rectum, he used to put his left forefinger into the wound, and keep it there till the internal incision was quite finished; first to direct the point of his knife into the groove of his staff, which he now felt with the end of his finger, and likewise to hold down the rectum, by the side of which his knife

was to pass, and so prevent its being wounded. This inward incision Cheselden made with more caution, than the former. His knife first entered the groove of the rostrated, or straight part of the catheter, through the sides of the bladder, immediately above the prostate, and, afterwards, the point of it continuing to run in the same groove in a direction downwards, and forwards, or towards himself, he divided that part of the sphincter of the bladder, which lies upon that gland, and then he cut the outside of one half of it obliquely, according to the direction and whole length of the urethra, that ran within it, and finished his internal incision, by dividing the muscular portion of the urethra on the convex part of his staff.

A sufficient opening being made, Cheselden used to rise from his chair, his finger still remaining in the wound. Next he put the beak of his gorget in the groove of the staff, and then thrust it into the bladder. The staff was now withdrawn, and, while he held the gorget with his left hand, he introduced the forceps, with the flat side uppermost, sliding them with great caution along the concavity of the gorget. When they were in the bladder, he withdrew the latter instrument, and taking hold of the two branches of the forceps with both his hands, he searched gently for the stone, having them still shut. As soon as this was felt, he used to open them, and try to get the lower blade under the stone, that it may fall more conveniently into their chops, and be laid hold of. This being done, the stone was extracted with a very slow motion, in order to give the parts time to stretch and dilate, turning the forceps gently in all directions.

When the stone was very small, and did not lie well in the forceps, Cheselden used to withdraw them, and introduce his finger into the bladder, in order to try to turn the stone, and disengage it from the folds of the lining of the bladder, in which it is sometimes entangled. Then the gorget was passed in again on the upper side of his finger, and turned as soon as the latter was pulled out; the forceps were introduced, and the stone extracted.

To preserve a soft stone from breaking, during its extraction, he used to put one or more of his fingers between the branches of his forceps, to prevent any greater pressure upon it than what was just necessary to hold it together. But, when it did break, or there were more than one, he used to extract the single stones, or fragments, one after another, repeating the introduction of his fingers and forceps, as often as there was occasion. Cheselden took care not to thrust the forceps so far into the bladder as to bruise, or wound its opposite side; and he was equally careful not to pinch any folds of its inner coat. In this way, Cheselden saved 50 patients out of 52, whom he cut successively in St. Thomas's Hospital. (*Appendix to the History of the Lateral Operation, by J. Douglas.* 1731.)

Cheselden, with all the enthusiasm of an inventor, believed, that he had discovered an operation, which was not susceptible of improvement; yet, he himself changed the manner of his incision no less, than three times in the course of a few years. 1st, He cut into the body of the bladder, behind the prostate, when he imitated Raw. 2dly, He cut another part of the bladder, viz. the neck and the thick substance of the prostate; this is his lateral mode of incision. 3dly, He changed a third time, not the essential form of the incision, but, the direction, in which he moved the knife; for, in his first operation, when imitating the supposed operation of Raw and Frere Jacques, he struck his knife into the body of the bladder, betwixt the tuber ischii and the vesiculæ seminales, and all his incision lay behind the prostate gland. In his second operation, he struck his knife into the membranous part of the urethra, immediately behind the bulb, and ran it down through the substance of the gland; but, his insision stopped at the membranous part, or body, of the bladder. But, in his third operation, he, after very large external incisions, struck his knife deeply into the great hollow under the tuber ischii, entered it into the body of the bladder immediately behind the gland, and, drawing the knife towards him, cut through the whole substance of the gland, and even a part of the urethra, "cutting the same parts the contrary way." By carrying the forefinger of the left hand before the knife, in dissecting towards the body of the bladder, he protected the rectum more perfectly, than he could do in running the knife backwards along the groove of the staff; and by striking his knife into the body of the bladder, and drawing it towards him, through the whole thickness of the gland, he was sure to make an ample wound. (*J. Bell's Principles of Surgery, Vol.* 2, *Part* 1, *p.* 152.)

LATERAL OPERATION AS PERFORMED AT THE PRESENT DAY WITH CUTTING GORGETS.

The gorget is the same instrument as the conductor used by Hildanus; but, having a cutting edge; and it was used in the Marian operation as a dilator and conductor for the forceps. Sir Cæsar Hawkins thought, that, when its right side was sharpened into a cutting edge,

it might be pushed safely into the bladder, guided by the staff, and make the true lateral incision, in the left side of the prostate gland, more easily, and with less risk of injuring the adjacent parts, than Cheselden could do with the knife, and surgeons were pleased with a contrivance, which saved them from the responsibility of dissecting parts, with the anatomy of which all were not equally well acquainted. (*J. Bell. Allan.*)

When the patient is of a plethoric habit, 16, or 20 ounces, of blood should be taken from his arm two days before the operation; a brisk purge administered the day before; and a clyster injected a couple of hours before cutting, in order to empty the rectum, and render it less liable to be wounded. It is to be lamented, that these prudent steps are so often neglected.

As it is advantageous to have the bladder somewhat distended with urine, the patient should be requested to retain it a certain time before being cut. When this cannot be done, as in children, some advise tying a ligature round the penis, or applying, what is called, a jugum, to prevent the patient from making the evacuation. The best practitioners in London, however, do not commonly adopt this method.

Before the operation, the following instruments should all be arranged ready on a table: three grooved staffs, of various sizes; a sharp gorget, with a beak nicely and accurately adapted to the grooves of the staffs, so as to glide easily and securely; a large scalpel for making the first incisions; forceps, of various sizes, for extracting the stone; a blunt-pointed bistoury for enlarging the wound in the prostate, if the incision of the gorget is not sufficiently large, as the parts should never be lacerated: a pair of Le Cat's forceps with teeth for breaking the stone, if too large to come through any wound reasonably dilated; a syringe for injecting the bladder, if necessary, to wash out clots of blood, or particles of the stone; a scoop for the latter purpose; two garters to tie the patient's hands to his feet.

After introducing the staff, and feeling that the stone is certainly in the bladder, the patient is to be secured in the same position, as we described in the account of Cheselden's latest method of operating.

The assistant, holding up the scrotum, with his left hand, is with his right to hold the staff, inclining its handle towards the right groin, to make the grooved convexity of the instrument turn towards the left side of the perinæum. Some operators, also, like the assistant to depress the handle of the staff towards the patient's abdomen, in order to make its convexity project in the perinæum, while others condemn this plan, asserting, that it withdraws the instrument from the bladder. (*Allan, &c.*)

The first incision should always commence, below the bulb of the urethra, over the membranous part of this canal, at the place, where the operator means to make his first cut into the groove of the staff, and the cut should extend about three inches, obliquely downward, to the left of the raphe of the perinæum, at equal distances from the tuberosity of the ischium and the anus. In a large man, the first cut should pass the anus an inch and a half or more; for, it is a general rule in surgery to make free external incisions, by which the surgeon is enabled to conduct the remaining steps of his operation with greater facility, and no where is it so necessary, as where a stone is to be extracted. (*Allan.*) The next object is to divide the transversales perinæi muscles, which stand, like a bar, across the triangular hollow, out of which alone the stone can be easily extracted. An opening is next to be made into the membranous part of the urethra, and now the operator has to accomplish a very important object, and one which is, for the most part, very much neglected; I allude to dividing the urethra with the knife, as far as possible along the groove of the staff, towards the bladder. When this is properly done, very little remains to be effected by that rougher instrument, the gorget.

Having placed the beak of the gorget in the groove of the staff, the operator takes hold of the latter instrument himself, raises its handle from the right groin, so that it may form nearly a right angle with the body, and he stands up. Before attempting to push the gorget onwards into the bladder, he should slide it backwards and forwards, with a wriggling motion, that he may be sure its beak is in the groove of the staff. The bringing forward the handle of the latter instrument, so as to elevate its point, before introducing the gorget into the bladder, is also of immense importance, for, it is by this means, that the gorget is introduced, along the groove of the staff in the axis of the bladder, the only direction, unattended with risk of wounding the rectum. In fact, the gorget should be introduced nearly in a direction, corresponding to a line drawn from the os coccygis to the umbilicus.

As soon as the gorget is introduced, the staff is to be withdrawn. Some operators next pass the forceps, along the concave surface of the gorget, into the bladder; while others, with every appearance of being right, recommend the cutting gorget to be withdrawn immediately it has completed the wound; for, then the bladder

contracts violently, and its fundus would be very apt to be cut, if the gorget were not withdrawn. This should be done in the same direction, in which it entered, pressing it towards the right side to prevent its making a second wound in coming out. If the operator should prefer passing the forceps into the bladder, along the gorget, the latter instrument must be kept quite motionless, lest its sharp edge should do mischief; and, at all events, immediately the forceps is in the bladder, the cutting gorget is to be withdrawn.

Some operators withdraw the cutting gorget, and introduce a blunt one for the guidance of the forceps; a step certainly unnecessary, as the latter instrument will easily pass, when the incision into the bladder is ample and direct, as it ought always to be.

The operator has next to grasp the stone with the blades of the forceps; for which purpose, he is not to expand the instrument, as soon as it has arrived in the bladder; but, he should first make use of the instrument as a kind of probe, for ascertaining the exact situation of the stone. If this body should be lodged at the lower part of the bladder, just behind its neck, the operator is to open the instrument immediately over the stone, and, after depressing the blades a little, is to shut them, so as to grasp it. Certainly, it is much more scientific to use the forceps at first, merely to ascertain the position of the stone; for, when this is known, he is much more able to grasp the extraneous body in a skilful manner, than if he were to open the blades of the instrument immediately, without knowing where they ought next to be placed, or when shut. No man can doubt, that the injury, which the bladder frequently suffers, from rough, reiterated, awkward movements of the forceps, is not an uncommon cause of such inflammation of this viscus, as too often extends to the peritonæum, and occasions death.

When the surgeon cannot readily get hold of the stone with the forceps, he should introduce his fore and middle fingers into the rectum, and raise the extraneous body up, when it may generally be easily grasped. The stone should be held with moderate firmness to keep it from slipping from the blades, but, not so forcibly as to incur the risk of its breaking.

Sometimes, the extraction of the stone is attended with difficulty, owing to the operator having chanced to grasp it in a transverse position, in which circumstance, it is better to try to change its direction, or let it go altogether, and take hold of it in another manner. When the stone is so large, that it cannot be extracted from the wound, without violence and laceration, the surgeon may either break the stone with a strong pair of forceps, with teeth constructed for the purpose; or he may enlarge the wound with a probe-pointed crooked bistoury, introduced under the guidance of the forefinger of the left hand. The latter plan is generally the best of the two; for, breaking the stone is an exceedingly unpleasant circumstance, as it creates such a danger of calculous fragments remaining behind.

However, as nothing can justify the exertion of force in pulling out a stone, if the operator should be afraid of making the wound more ample, (its being already large and direct) he must break the stone, as above described. As many of the fragments are then to be extracted with the common lithotomy forceps, as can be taken away in this method, after which the surgeon should introduce his finger, in order to feel, whether any pieces of the stone still remain behind. Perhaps, some of these may be most conveniently taken out with the scoop; but, if they are very small, it is best to inject lukewarm water with moderate force into the wound, for the purpose of washing them out

The stone should always be examined immediately it is extracted; because, its appearance conveys some information, though not positive, concerning the existence of others. If the stone is smooth on one surface, the smoothness is generally found to arise from the friction of other stones still in the bladder; but, when it is uniformly rough, it is a presumptive sign, that there is no other one remaining behind. In every instance, however, the surgeon should introduce his forefinger, for the purpose of examining; for, it would be an inexcusable neglect to put the patient to bed, with another stone in his bladder.

After the operation, a simple pledget should be laid on the wound, and supported with a T bandage; the patient should lie in bed on his back, with his thighs closed; folded cloths should be laid under him to receive the urine; and a large opiate administered, as after all grand operations.

OF SOME PARTICULAR METHODS AND INSTRUMENTS.

M. Foubert, a very eminent surgeon at Paris, devised and practised a plan of his own, which however, has not been considered by others, as worthy of being imitated. The patient, having retained his urine, so as to distend his bladder, an assistant, with a convenient bolster, presses the abdomen a little below the navel, in

such a manner, that by pushing the bladder forwards, he may make that part of it protuberate, which lies between the neck and the ureter. The operator, at the same time, introduces the fore-finger of his left hand up the rectum, and drawing it down towards the right buttock, pushes in a trocar on the left side of the perinæum, near the great tuberosity of the ischium, and about an inch above the anus. Then the trocar is to be carried on parallel to the rectum, exactly between the erector penis and accelerator urinæ muscles, so as to enter the bladder on one side of its neck. As soon as the bladder is wounded, the operator withdraws his fore-finger from the anus.

In the upper part of the cannula of the trocar, there is a groove, the use of which is to allow some urine to escape, immediately the instrument enters the bladder, that the trocar may not be pushed in any further; but, its principal use is for guiding the incision. As soon as the urine began to flow, Foubert, retracting the trocar a little, without drawing it quite out of the cannula, introduced the point of a slender knife into the groove in the cannula; and, by the guidance of this groove, he ran it onwards into the bladder, and was aware of the knife having actually entered this viscus, by the urine flowing still more freely. Then raising the knife from the groove, he made his incision, about an inch and a half in length, through the neck of the bladder, by moving the knife from that point, at which it had entered upwards towards the pubes. And, finally, by moving the handle more largely, than the point of the knife, he opened the outer part of the wound to whatever extent the size of the stone seemed to require, and then, withdrawing the knife, he introduced a blunt gorget to guide the forceps.

An effort was made by Thomas to improve this method; but, he failed; and it was never much adopted. The inability of many bladders to allow being distended, is an insuperable objection; for, without this, the trocar is liable to pass between the bladder and rectum, and even through the bladder into the pelvis. (*Mémoires de l'Acad. de Chir.* 663, *vol.* 1. *Le Dran's Parallèle. Sharp's Critical Inquiry. J. Bell's Principles, vol.* 2.)

About the middle of the last century, Frere Cosme constructed for lithotomy, a a knife, concealed in a sheath, out of which it started on touching a lever. This instrument is entitled to particular attention, because it is still used in several parts of the continent, and even in this country, by the surgeons of the Westminster Hospital. Frere Cosme made the same external incisions, as in the lateral operation, and, after dividing the membranous part of the urethra, he inserted into the groove of the staff the point of his *lithotome*, or *bistourie cachée*, and pushed it into the bladder, after which the staff was withdrawn. The edge of the knife was then turned sideways, and the lever in the handle being touched, the blade started from its sheath, and, being drawn out, divided the prostate and neck of the bladder. The danger of wounding the pudic artery; of injuring the bladder in more places than one, if collapsed; and of cutting the rectum, if the edge of the instrument should be inclined too much downward; are the objections, which have been urged against the employment of the lithotome of Frere Cosme. The second is the only one, that has much validity, and even it might be done away, by not introducing the instrument too far, and yet carrying on the incision just as far laterally, as would be the effect of having more of the instrument to withdraw from the bladder. If this were not done, the wound would be too small to admit of the stone being extracted, without laceration.

Le Cat, a surgeon, of Rouen, in Normandy, devised a mode of lithotomy, which would be too absurd to be described, were it not so much renowned. He thought the neck of the bladder might be dilated, like that of the wound, and his operation was deformed with all the cruelty of the Marian method, and every error attendant on the infant state of the lateral operation. He first introduced a long big staff; he cut forward with a common scalpel, through the skin and fat, till he could distinguish the bulb, the naked urethra, and the prostate gland. Secondly, with another knife, called urethrotome, having a groove on one side, he opened the urethra, just before the prostate, and, fixing the urethrotome in the groove of the staff, and holding it steady, rose from the kneeling posture, in which he performed the outward incision.—Thirdly, holding the urethrotome in the left hand, he passes another knife, the cystotome, along the groove of the urethrotome, and the beak of the cystotome being lodged in the groove of the urethrotome, it was pushed forwards, through the substance of the prostate gland into the bladder. Fourthly, drawing the cystotome a little backwards, he gives the staff to an assistant to be held steadily, and lifting a blunt gorget in the right hand, he places the beak of it in the groove of the cystotome, and runs it onwards, till it glides from the groove of the cystotome, along the groove of the staff into the bladder. Then, true to the principles of the apparatus major, and, never forgetting his own peculiar theory, *little incision, and much dilatation*, he forced his fingers

along the gorget, dilated the neck of the bladder, and so made way for the forceps. (*J. Bell's Principles, Vol.* 2.)

In 1741, Le Dran described an operation, the introduction of which has been claimed by several since his time. A staff being introduced, and two assistants keeping open the patient's knees, while a third stands on one side of him on a chair, (Le Dran says,) "I then raise up the scrotum, and directing the last assistant to support it with both hands, so as to avoid bruising it, by pressing it either against the staff, or the os pubis, I place his two forefingers on each side of the part, where the incision is to be made; one of the fingers being laid exactly along that branch of the ischium, which rises towards the pubes, and the other pressed upon the raphe, that the skin may be kept fixed and tight. While I thus place the fingers of the assistant, who supports the scrotum, I still keep hold of the handle of the staff, and direct it so as to form a right angle with the patient's body; at the same time, taking care, that the end of it is in the bladder. This position is the more essential, as all the other instruments are to be conducted along the groove of this. If the handle of the staff were kept inclined towards the belly, the end of it would come out of the bladder, and the gorget, missing its guide, would slip between that and the rectum.

"The staff being rightly placed, I take the knife from the assistant, who holds the instruments, and put it into my mouth; then pressing the beak of the staff against the rectum, I feel the curvature of it through the perinæum. The incision ought to terminate, an inch and a half, below where we feel the bottom of the curvature. If we do not carry this incision sufficiently low, it may happen not to be of a size to allow the extraction of a large stone, and might lay us under the necessity of extending it further afterwards, for the skin will not lacerate here, nor easily give way for the passage of the stone. I therefore begin the incision from the lower part of the os pubis, continuing it down to the place, that I before directed for its termination; after which I pass the point of the knife into the groove of the staff, and cutting from below upwards, without taking the point out of the groove, I open the anterior part of the urethra, as far as the incision, that is in the skin.

"The beak of the staff, which was pressed upon the rectum, must now be raised and pressed against the os pubis. At the same time, I turn the handle towards the right groin, that the groove, which is at the beak of the staff, may face the space, between the anus and the tuberculum ischii on the left side. Then carrying the point of the knife down the groove, I slide it along the beak, turning the edge, that it may face the space, between the anus and tuberosity of the ischium. By this incision, I exactly divide the bulb of the urethra, and by doing this on its side, we are sure to avoid wounding the rectum, which, for want of this precaution, has been often cut. This first incision being made, I again pass the point of the knife into the curvature of the staff to the part, where it bears against the perinæum, and direct it to be held there by the assistant, who supports the scrotum. This done, I take a large director, the end of which is made with a beak, like that of a gorget, and conveying this beak, upon the blade of the knife, into the groove of the staff, I draw the knife out. I then slide the beak of this director, along the groove of the staff, into the bladder, and I withdraw the staff by turning the handle towards the patient's belly. The following circumstances will sufficiently satisfy us, that the director is introduced into the bladder; first, if it strikes against the end of the staff, which is closed; secondly, if the urine runs along the groove. I next feel for the stone with this director, and, having found it, endeavour to distinguish its size and surface, in order to make choice of a proper pair of forceps; that is, one of a stronger, or weaker make, or of a large or small size, agreeably to that of the stone; after which I turn the groove, towards the space, between the anus and tuberosity of the ischium, and, resting it there, convey a bistoury along the groove, the blade of which is half an inch broad, and about three quarters of an inch long. I continue the incision, made by the knife in the urethra, and entirely divide the prostate gland laterally, as also the orifice of the bladder; and, I am very certain, that the introducing the use of these two instruments, which are not employed by other lithotomists, does not prolong the operation a quarter of a minute, but, rather shortens the time, both by facilitating the dilatation, that is afterwards to be made with the finger, and by rendering the extraction of the stone more easy. The bistoury being withdrawn, the groove of the director serves to guide the gorget into the bladder. I then introduce my forefinger along the gorget (which is now easily done, as the urethra and prostate, being divided, do not oppose its entrance) and with it I dilate the passage for the stone, in proportion to the size, of which I discover it to be. This dilatation being made, I withdraw my finger, and use the proper forceps." (*Le Dran's Operations, edit.* 5, 1784, *London.*)

The high operation, which we have already described, was introduced by Franco, in 1561, and was again revived in 1658 by Frere Cosme, with what were supposed to be some improvements. The latter proposed to open the bladder in perinæo, and then, through an opening made just above the pubis, he introduced a scalpel with a button-point, with which he slit up, for an inch or two, the linea alba, the knob on the end of the knife pushing aside the peritonæum. After this, he introduced, by the aperture in perinæo, a staff, with which he projected the bladder through the opening, between the recti muscles: this done, he cut into the front of the bladder, and either with his finger and thumb, or with a pair of forceps, he took out the stone. In this way, he extracted a calculus from the bladder, weighing 24 ounces. Were it not for the danger attendant on the double incision into the bladder, and the protraction of the operation by the dissection about the perinæum, this plan might, with propriety, be adopted. Indeed, as modified by Deschamps, who, in place of the puncture in perinæo, perforates the bladder from the rectum, it has met with the approbation of Dr. Thomson, of Edinburgh, who considers this, on particular occasions, to be the most advisable mode of operating. It is evident, however, that if the bladder be thickened and indurated, it will be impossible to raise it above the pubes with the cannula, and, consequently, the plan is only admissible when we have reason to suppose that the stone is too large to be removed from the perinæum, and the bladder is healthy. The puncture from the rectum is simple, attended with no increase of danger, allows the bladder to be elevated by the cannula, and secures a depending outlet for the urine. We avoid thus the necessity of any discharge by the wound above the pubes, we run no risk of the urine insinuating itself into the cellular membrane; no inflammation is excited; no sinuses are formed. (*Burns, in Edinb. Surg. Journal, No.* 13.)

The danger of the beak of the gorget slipping out of the groove of the staff, is one of the chief objections urged against the employment of the first of these instruments. To obviate this, Sir Charles Blicke had the groove of the staff, and the beak of the gorget, so constructed that they locked into each other, and continued fixed till near the extremity of the staff. The contrivance, though plausible and ingenious, is not much used: the point of contact of the beak and body of the instrument is necessarily so small, that it is liable to break. It is allowed, however, that this objection might be removed; but another one is still urged, viz. the beak and groove catching on each other, so as to resist the efforts made to introduce the gorget into the bladder. Every operator knows, that much of the safety of the lateral operation, as performed at present, depends on the ease with which the beak of the gorget slides along the groove of the staff. Le Cat, in 1747, is said to have devised a similar instrument.

Some operators seem to have a good deal of trouble in dissecting into the groove of the staff. Sir James Earle invented an instrument to render this more easy. It consists of a short staff, with an open groove, connected by a hinge, with the handle of another staff of the usual size, shape, curvature, and length, which may be called the *long staff*. The hinge, by means of a pin, is capable of being disjointed at pleasure. The short staff is sufficiently curved to go over the penis and scrotum, and long enough to reach to that part of the long staff which is just below the beginning of its curvature. The end of the short staff, made somewhat like a pen, with the sides sharpened and finely pointed, is adapted to shut into the groove of the long staff, and its cutting edges are defended from being injured by a proper receptacle which is prepared for it in the groove of the long staff. When the instrument is shut, the groove of the short staff leads into that of the long one, so as to form one connected and continued groove. The short staff is rendered steady by the segment of an arch projecting from the long one through it.

The long staff, separated from the short one, is first introduced in the usual manner, and, the stone having been felt, the short staff is to be put on the other at the hinge. The incision is then to be made in the usual manner, through the skin and cellular membrane, and a second incision through the muscles, so as nearly to lay bare the urethra. The operator then being perfectly convinced, that the extremity of the long staff is sufficiently within the bladder, must bring the end of the short staff down, and press it against the urethra, which it will readily pierce, and pass into the cavity prepared for it in the groove of the long staff. The two staffs being now firmly held together by the operator's left hand, nothing remains to be done, except applying the beak of the gorget, to the groove of the short staff, and push it on till it be received in the groove of the long one; and if this latter be made with a contracted groove, it will just enter where the contraction begins, and thus must be safely conducted into the bladder. (*Earle on the Stone; Appendix; Edit.* 2, 1796;) Deschamps describes an instrument, invent

ed by Jarda, a surgeon of Montpelier, which bears a resemblance to Earle's double staff, but was more complicated, being designed to support the scrotum, and also press the rectum out of the way.

With respect to the method of using the double staff, would it be proper, immediately after piercing the urethra with the point of the short staff, to plunge the gorget into the bladder, without having previously divided with a knife the membranous part of the urethra? The reader will hardly approve of this plan, whatever opinion he may entertain of the utility of the instrument.

The late Mr. Dease, of Dublin, and Mr. Muir, of Glasgow, considering that the gorget was more apt to slip from the staff in consequence of the latter being curved, and that its beak never slips from the groove of the staff in operating on women, proposed, like Le Dran, to convert the male into the female urethra. They introduce, as usual, a curved grooved staff into the bladder, make the common incision, and open the membranous part of the urethra; but, instead of introducing a gorget on the curved staff, they conduct along the groove a female one into the bladder, and immediately withdraw the other. The gorget is then introduced. This method certainly removes the danger arising from the slipping of the latter instrument.

LITHOTOMY, AS PERFORMED WITH A KNIFE, INSTEAD OF A CUTTING GORGET, BY SEVERAL OF THE MODERNS.

We have already described, how Frere Jacques and Cheselden used to operate with a knife, without any cutting gorget, in the early state of the lateral operation. The success, which attended the excellent practice of the latter surgeon, certainly far exceeds what attends the present employment of the gorget, for, out of 52 patients, whom he cut successively for the stone, he only lost two; and out of 213, of all ages, constitutions, &c. only 20. These facts are strongly in favour of abandoning the use of the gorget, and doing its office with a knife.

The objections to the gorget are numerous and well founded. In the hands of many skilful operators, its beak has slipped out of the groove of the staff, and the instrument has been driven either between the rectum and the bladder, or into the intestine instead of the latter viscus. Sir James Earle remarks: "I have more than once known a gorget, though passed in the right direction, pushed on so far, and with such violence, as to go through the opposite side of the bladder." Bromfield, even when operating with a blunt gorget, burst through the bladder and peritonæum, so that the abdominal viscera came out of the wound. (P. 270.) I knew of one instance in which the gorget, slipping from the staff, completely severed the urethra from the bladder; the stone was not taken out, and the child died.

We will suppose, however, that the preceding dangers of the gorget are surmounted, as they certainly may be, by particular dexterity, seconded by the confidence of experience. The gorget is introduced, but whatever kind of one has been used, the wound is never sufficiently large for the easy passage of any stone, except one below the ordinary size. Camper has noticed this fact: "Hawkensius solo conductore, cujus margo dexter in aciem assurgit, idem præstat: *omnes plagam dilatant, ut calculum extrahent: dilacerentur igitur semper vesicæ ostium et prostata.*" (P. 114.) Dease says: "In all the trials that I have made with the gorget on the dead subject, I have never found the opening into the bladder sufficiently large for the extraction of a stone of a middling size, without a considerable laceration of the parts. I have frequently taken the largest-sized gorget, and could not find, in the adult subject, I ever entirely divided the prostate gland, if it was any way large; and in the operations that were performed here on the living subject, if the stone was large, the extraction was painfully tedious, and effected with great difficulty, and, in some cases, not at all."

I shall dismiss this part of the subject with referring the reader to the spirited and correct remarks on the objections to the gorget in Mr. John Bell's Principles, Vol. 2, Part 2.

The latter author recommends the external incision, in a large man, to commence about an inch behind the scrotum, and to be carried downwards three inches and a half, midway between the anus and tuberosity of the ischium. The fingers of the left hand, which at first kept the skin tense, are now applied to other purposes. The fore finger now guides the knife, and the operator proceeds to dissect through fat and cellular substance, and muscular and ligamentous fibres, till the wound is free and open, till all sense of stricture is gone; for it is only by feeling opposition and stricture, that we recognize the transverse muscle. When this hollow is fairly laid open, the external incision, *which relates merely to the free extraction of the stone, is completed.* If it were the surgeon's design to operate only with the knife, he would now push his fingers deeply into the wound, and, by the help of the fore-finger, dissect from the urethra along the body of the gland, till he distinguished its thickness and solidity, and reached its back part. Then, plung-

ing his knife through the posterior portion of the gland, and settling it in the groove of the staff, he would draw it firmly and steadily towards him, at the same time pressing it into the groove of this instrument, and then the free discharge of the urine, assuring him that the prostate and neck of the bladder were divided, he would lay aside his knife, pass the left fore-finger into the bladder, withdraw the staff, and introduce the forceps. (*John Bell, p.* 197.)

Mr. Charles Bell describes the following method of operating with a knife, instead of a gorget. A staff grooved on the right side, a scalpel with a straight back, and the common lithotomy forceps, are the indispensable instruments. The staff is kept in the centre, and well home into the bladder. The surgeon making his incision under the arch of the pubes, and by the side of the anus, carries it deeper towards the face of the prostate gland: cutting near to the staff, but yet not cutting into it, and avoiding the rectum by pressing it down with the finger. Now carrying the knife along the staff, the prostate gland is felt. The point of the knife is run somewhat obliquely into the urethra, and into the lateral groove of the staff, just before the prostate gland. It is run on, until the urine flows. The fore-finger follows the knife, and it is slipped along the back of it, until it is in the bladder. Having carried the fore-finger into the bladder, it is kept there, and the knife is withdrawn. Then the forceps, directed by the finger, are introduced. (*C. Bell's Operative Surgery, Vol.* 1, *p.* 361.)

Mr. Allan Burns, of Glasgow, recommends the following plan: "The plan, says he, introduced by Cheselden, and revived by Mr. J. Bell, I would assume, as the basis of the operation; but still, along with their mode, I would blend that of Mr. Dease, by which, I imagine, we may overcome some of the disadvantages attendant on each considered individually.

"For more than twelve months, I have been in the habit of shewing such an operation, which is as simple in its performance, as the one in general use, is attended with less danger to the patient, permits of an incision varying in size, according to the wish of the operator, and completely prevents injury of the rectum, or pudic artery. To perform this operation, I introduce into the urethra a common curved staff, then make the usual incision into the perinæum, divide fully and freely the levator ani, so as to expose the whole extent of the membranous part of the urethra, the complete extent of the prostate gland, and a portion of the side of the neck of the bladder. When this part of the operation is finished, I open the membranous part of the urethra, and introduce through the slit a straight or female staff, with which I feel the stone, and then withdraw the curved staff. This done, I grasp the handle of the staff firmly in my left hand, and with the right lay hold of the knife. Having ascertained, that the two instruments are in fair contact, I rest the one hand upon the other, pressing them together, and then by a steady extraction, I pull out the knife and staff together, which is preferable to drawing the knife along the staff; it prevents the risk of the one slipping from the other; it guards the bulb of the urethra, and every other part from injury; for, between them and the cutting instrument, the staff is interposed;" &c. "When introducing the knife, the side of the blade must be laid flat along the fore-finger of the right hand, which is to project a little beyond the point. In this state the finger and knife are to enter the wound, opposite the tuber-ischii; but, in proportion as they pass along, they are to be inclined forward, till at last, with the point of the finger, the staff is to be felt through the coats of the bladder, a little beyond the prostate, and rather higher than the orifice of the urethra. Here the knife is to be pushed, with the finger, through the bladder, and when the point is fairly fixed in the groove of the staff, the operation is to be finished by the steady extraction of both instruments." (*Allan Burns, in Edinburgh Surgical Journal, No.* 13.)

The knife of Cheselden does not require so much violence to divide the parts as the gorget does; cannot slip in some instances before, in others behind the bladder; and it will make a wound sufficiently ample for the easy extraction of the stone, without the least laceration. The possibility of its wounding the rectum, Mr. Thomson thinks might be obviated by employing it as follows: "After having made the external incisions, and divided the membranous part of the urethra, in the way that is usually done for the introduction of the beak of the gorget, a straight-grooved staff is to be introduced into the groove of the curved staff, and pushed along it into the bladder. The curved staff is then to be withdrawn, and the surgeon, laying hold of the handle of the straight staff with his left hand, and turning the groove upwards and a little outwards, presses the back of it downwards towards the right tuber ischii, and holds its steadily in that position. The point of a straight-backed scalpel being now introduced into the groove of the staff, with its cutting edge inclined upwards and a little outwards, is to be pushed gently forwards into the

b adder. The size of the sca'pel need only be such as will make a wound in the prostate gland and neck of the bladder, sufficiently large to admit the fore-finger of the left hand. The scalpel being removed, this finger is to be introduced into the bladder, through the wound which has been made, and the staff may then be withdrawn. With the finger the surgeon endeavours to ascertain the size and situation of the stone. If, after this examination, he judges the incision in the neck of the bladder to be too small for the easy extraction of the stone, he next introduces into the bladder a straight probe-pointed bistoury, with its side close to the fore part of his finger, and its cutting edge upwards. By turning this edge towards the left side, and by keeping the point of his finger always beyond the point of the bistoury, he may safely divide, in the direction of the first incision as much of the prostate gland, and neck of the bladder, as he shall deem necessary." See *Observations on Lithotomy, &c. with a Proposal for a New Manner of Cutting for the Stone, by J. Thomson, M. D. one of the Surgeons of the Royal Infirmary, &c. Edinb.* 1808. In this small work, the reader will find additional particulars.

Mr. Allan, who is a strenuous advocate for using the knife instead of the gorget, directs us, after laying bare the urethra, and bringing the staff so as to form a right angle with the patient's body, to feel that the instrument is fairly lodged in the bladder. The operator is to use the fore-finger of his left hand as a director in feeling for the groove in the staff, and in distinguishing the prostate gland; and, with this finger, he is to depress the rectum, and direct the deeper part of his dissection. "Feeling the gland, with the point of the fore-finger of the left hand, and the groove of the staff in the upper part of the wound, the assistant is desired to steady his hand, and the operator, holding his knife as he does a writing pen, his fingers an inch and a half from the point, turns up its edge towards the staff, and strikes its point through the membranous part of the urethra into its groove, half an inch before the prostate gland. He now turns the back of the knife to the staff, slides it a little backwards and forwards in the groove, that he may be sure he has fairly entered; then shifts the fore-finger, with which he guides the incision, places it under the knife, and carries always before the point of it, to prevent the rectum being wounded; he then lateralizes the knife, enters the substance of the prostate, is conscious of running the scalpel through its solid and fleshy substance, and judges, by the finger, of the extent of the incision, which he now makes. The urine flows out; he slips in the finger into the opening, withdraws the scalpel, and gives it to an assistant, who hands him the forceps, which he passes into the bladder, using the fore-finger of his left hand, which is still within the wound, as a conductor. The forceps instantly encounter the staff, which serves to conduct them safely into the bladder, while the finger guides them through the wound;" &c. (*Allan on Lithotomy, p.* 48, *Edinb.* 1808.)

I leave the reader to judge, which of the foregoing modes of operating with a knife, claims the preference. Perhaps Cheselden's manner, which is also Mr. John Bell's, is as deserving of recommendation as any.

Mr. Lawrence has, very obligingly, allowed me to insert in this work the following case, in which he performed lithotomy with a common knife, and without any gorget. He describes the method which he took, as follows: "On the first of December, 1808, I performed the operation of lithotomy on Mr. Richard Cooper, aged 63, in the presence of Mr. Crowther, surgeon to Bridewell and Bethlem Hospitals, Mr. Barnes, a pupil of St. Bartholomew's, and some other gentlemen. The patient was very fat, particularly about the nates and perinæum, so that my fore finger was buried beyond the middle joint before I had laid bare the groove of the staff, which I made a point of doing behind the bulb of the urethra, having always considered any division of the bulb to be perfectly useless, and even prejudicial. I continued the incision through the prostate, and neck of the bladder, with the same instrument that was used for making the first cut, (a common scalpel,) carried horizontally, with its back in the groove of the staff, until it reached the bladder, and then moved obliquely outwards and downwards, so as to obtain a cut of the requisite size in the neck of that viscus. The quantity of fat was so considerable, that I could barely feel the stone with the end of my fore-finger pushed as high up as possible. I employed the left fore-finger as a conductor for the forceps, and extracted, without the least violence, a stone measuring five inches in its greatest, and four in its least, circumference. No unpleasant symptom followed the operation, not the slightest mark of inflammation, nor the least pain, nor tension of the abdomen.

"I have publicly demonstrated to the pupils of St. Bartholomew's the mode of operating with an ordinary knife, and have repeatedly practised it in the dead subject, without ever experiencing the slightest difficulty in making an open-

ing of any extent that I wished into the bladder *."

LITHOTOMY IN WOMEN.

Women suffer much less from the stone than men, and far less frequently stand in need of the operation of lithotomy. It is not, however, that their urine will not so readily produce the concretions, which are termed urinary calculi. The reason is altogether owing to the shortness, largeness, and very dilatable nature of the female urethra; circumstances, which in general render the expulsion of the stone with the urine almost a matter of certainty. The records of surgery present us with numerous instances, where calculi of vast size have been spontaneously voided through the meatus urinarius, either suddenly without pain, or after more or less time and suffering. Heister mentions several well authenticated examples of this kind. Middleton has also related a case, where a stone, weighing four ounces, was expelled in a fit of coughing, after lodging in the passage a week. Collot speaks of another instance, where a stone about as large as a goose's egg, after lying in the meatus urinarius seven or eight days, and causing a retention of urine, was voided in a paroxysm of pain. A remarkable case is related by Dr. Molineux in the early part of the Philosophical Transactions: a woman voided a stone, "the circumference of which measured the longest way seven inches and six-tenths, and round about, where it was thickest five inches and three-quarters; its weight near two ounces and a-half troy.

Sometimes, after the passage of large calculi, the patient has been afflicted with an incontinence of urine; but, in general, this grievance lasts only a short time.

The naturally large size and dilatable nature of the female urethra, have suggested the plan of endeavouring to expand this passage by various means, so that a stone in the bladder may be taken out with a pair of forceps, without having occasion to employ any cutting instrument whatsoever. This method was proposed by Douglas nearly a century ago, who not only recommended the use of sponge for the purpose, but also dried gentian root, as being more gradual in its expansion, and better adapted to the object.

Mr. Bromfield has published the case of a young girl, in whom he effected the necessary dilatation by introducing into the meatus urinarius, the appendicula cœci of a small animal in a collapsed state, and then filling it with water by means of a syringe. The piece of gut, thus distended, was drawn out, in proportion as the cervix vesicæ opened, and, in a few hours, the dilatation was so far accomplished, that the calculus had room to pass out. (See *Chirurgical Obs. and Cases, Vol.* 2. *p.* 276.)

Mr. Thomas very recently met with a case, in which, after dilating the meatus urinarius with sponge tent, he succeeded in extracting an earpicker which lay across the neck of the bladder. The passage was so much enlarged, that the left fore-finger was most easily introduced, and (says this gentleman) "I believe had the case required it, both thumb and finger would have passed into the bladder, without the smallest difficulty." After adverting to this, and other facts, proving the ease, with which the female urethra can be dilated, Mr. Thomas remarks: "If these relations can be credited, and there is no reason why they should not, I can hardly conceive any case, in a young and healthy female subject, and where the bladder is free from disease, where a very large stone may not be extracted, without the use of any other instrument, than the forceps, the urethra having first been sufficiently dilated by means of the sponge tents. For this purpose, the blades of the forceps need not be so thick and strong, as those commonly employed. (See *Medico Chirurgical Transactions, Vol.* 1, *p.* 123—129.)

Some surgeons have extracted stones from the female bladder in the following manner: the patient having been placed in the position commonly adopted in the lateral operation, a straight staff, with a blunt end, is introduced into the bladder, through the meatus urinarius. The surgeon then passes along the groove of the instrument the beak of a blunt gorget, which instrument becoming wider towards the handle, effects a part of the necessary dilatation. The staff being withdrawn, and the handle of the gorget taken hold of with the left hand, the right fore-finger with the nail turned downwards, is now introduced slowly along the concavity of the instrument. When the urethra and neck of the bladder have thus been sufficiently dilated, the finger is withdrawn, and a small pair of forceps passed into the bladder. The gorget is now removed, and the stone taken hold of, and extracted. (See *Sabatier's Médecine Opératoire, tom.* 2. *p.* 103.

Notwithstanding these favourable accounts of the practice of dilating the female urethra, for the purpose of removing calculi from the bladder, the generality of

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* The above patient afterwards died in a kind of fit; but to all appearances, from a cause, which had no connexion with the operation.

surgeons prefer the plan of making an incision. It is certain, that some patients have found the method insufferably tedious and painful. But the strongest objection to the practice has arisen from the incontinence of urine, which occasionally follows any great distention of the urethra and neck of the bladder. Mr. Thomas believes, however, that this unpleasant symptom is quite as often a consequence of the operation of lithotomy, as now usually performed. (*Medico Chirurgical Transactions, Vol.* 1, *p.* 127.)

Lithotomy on females is much more easy of execution, and less dangerous than the same operation on the male subject. It may be done in various ways; but, the surgeons of the present time constantly follow the mode of making the requisite opening by dividing the urethra and neck of the bladder. A straight staff, or director, is introduced through the meatus urinarius; the groove is turned obliquely downwards and outwards, in a direction parallel to the ramus of the left os pubis; and a gorget, or knife, is thus conducted into the bladder, and makes the necessary incision. Some operators prefer the lithotome caché, which, after being introduced, is opened as far as is deemed proper, and then drawn out with its edge turned obliquely outwards and downwards.

The French surgeons Louis and Flurant, were the inventors of particular bistouries for dividing both sides of the female urethra at once. The instrument of the former effected this purpose, in passing from without inwards; that of the latter, in passing from within outwards. Flurant's bistoury bears some resemblance in principle to Frère Côme's lithotome caché, or to the cutting forceps, with which Franco used to divide the neck of the bladder. The reason, assigned in recommendation of these bistouries, is, that they serve to make a freer opening for the passage of large stones, than can be safely made by cutting only in one direction. At present, however, they are never used. Were the stone known to be very large, Sabatier seems to prefer the apparatus altus.

A case may present itself, in which the posterior part of the bladder drawn downwards by the weight of the stone, may displace a portion of the vagina, and make it protrude at the vulva in the form of a swelling. Here, there would be no doubt of the propriety of cutting into the tumor, and taking out the foreign body contained in it. Rousset performed such an operation, and Fabricius Hildanus in a case, where the stone had partly made its way into the vagina, enlarged the opening, and successfully extracted the foreign body.

M. Mery once made the proposal of cutting into the posterior part of the bladder, through the vagina, after introducing a common curved staff; but the apprehension of urinary fistulæ made him abandon the project.

The existence of extraordinary circumstances may always render a deviation from the common modes of operating not only justifiable, but absolutely necessary. Thus, Tolet met with a case, where a woman had a prolapsus of the uterus, with which the bladder was also displaced. In the latter viscus, several calculi were felt. An incision was made into it, and the stones extracted, after which operation, the displaced parts were reduced, and a speedy cure followed. (*Sabatier's Médecine Opératoire, tom.* 2, *p.* 107.)

TREATMENT AFTER THE OPERATION.

If the internal pudental artery should have been cut, and bleed profusely, the best plan is to introduce into the wound a piece of firm sponge, with a large cannula passed through its centre. The expanding property of the sponge, on its becoming wet, will make the necessary degree of compression of the vessel, which lies too deeply to be tied. The coagula should be washed out of the bladder, if they should appear to have lodged in it, by injecting luke-warm water,

I cannot say, that it has fallen to my lot to see many cases (out of the great number which I have seen in Bartholomew's Hospital), in which death could be imputed to hemorrhage, notwithstanding the bleeding has often been so profuse, and from so deep a source, just after the operation, as to leave no doubt, that it proceeded from the internal pudental artery. Such hemorrhage generally stopped before the patient was put to bed.

The majority of patients who die after lithotomy, perish of peritoneal inflammation. Hence, on the least occurrence of tenderness over the abdomen, copious venesection should be put in practice. At the same time, eight or ten leeches should be applied to the hypogastric region. The belly should be fomented, and the bowels kept open with the oleum ricini. The feebleness of the pulse should not deter the practitioner from using the lancet; this symptom is only fallacious; and it is attendant on all inflammation within the abdomen. Together with the above measures, the warm bath, a blister on the lower part of the abdomen, and emollient glysters, are highly proper. I have seen several old subjects die of the irritation of a diseased thickened bladder, continuing after the stone was extracted. They had not the acute symptoms, the in-

flammatory fever, the general tenderness and tension of the abdomen, as in cases of peritonitis; but they referred their uneasiness to the lower part of the pelvis; and instead of dying in the course of two or three days, as those usually do, who perish of peritoneal inflammation, they, for the most part, lingered for two or three weeks after the operation. In these cases, opiate glysters, and blistering the hypogastric region, are the best measures. In some instances of this kind, abscesses form about the neck of the bladder.

Whoever wishes to acquire a perfect knowledge of the history of lithotomy should consult the following works: *Celsus de Re Medicâ. lib. 7. cap. 26. Remarques sur la Chirurgie de Chauliac, par M. Simon de Mingelouzeaux, tom. 2; Bourdeaux,* 1663. *La Legende du Gascon par Drelincourt; Paris,* 1665. *Van Hornæ's Opuscula. Marianus de Lapide Vesicæ per Incisionem extrahendo;* 1552. *Parallèle des Différentes Manières de tirer la Pierre hors de la Vessie;* 1730. *Sharp's Operations Sharp's Critical Enquiry. Le Dran's Operations, Edit. 5; London,* 1781. *Franco's Traité des Hernies;* 1561. *Rosetus de Partu Cæsario. Traité de la Lithotomie, par Tolet. Heister's Surgery, Part 2. Lithotomia Douglassiana;* 1723. *Morand de alto Apparatu. Observations sur la Manière de Tailler, &c. pratiquée par Frère Jacques; par J. Mery. Cours d'Opérations de Chirurgie par Dionis. Traité des Opérations par Garengeot, tom. 2. Morand Opuscules de Chirurgie. Bertrandi Traité des Opérations. Index Supellectilis Anatomicæ Ravianæ; Leidæ,* 1725. *Le Cat, Recueil de Piéces sur l'Opération de la Taille, Part 1; Rouen,* 1749. *Cosme, Recueil de Piéces Anatomiques importantes sur l'Operation de la Taille; Paris,* 1751—1753. *J. Douglas, Postscript to Hist. of the Lateral Operation;* 1726. *Cheselden's Anatomy,* 1730; *and subsequent editions. J. Douglas, Appendix to Hist. of the Lateral Operation;* 1731. *A short Historical Account of Cutting for the Stone, by W. Cheselden, in his own last edition of his Anatomy, Falconet in Thes. Chirurg. Halleri; thes.* 103, *t.* 4, *p.* 196. *Hartinkeil. Tractatus de Vesicæ Urinariæ calculo, &c.* 1785. *Traité Historique et Dogmatique de l'Opération de la Taille par J. F. L. Deschamps, in four tomes 8vo, Paris,* 1796. *This last work is a very complete and full account of the subject up to the time of its publication, and well merits a careful perusal. Richerand's Nosographie Chirurgicale, tom. 3, p. 500, &c. Edit. 2. Levéillé's Nouvelle Doctrine Chirurgicale, tom. 3, p. 533. John Bell's Principles of Surgery, Vol. 2. Part 1. Burns, in Edinb. Med. and Surg. Journal, January,* 1808. *C. Bell's Operative Surgery, Vol. 1.* 1807. *Sabatier, de la Médecine Opératoire, tom. 2,* 1796. *Thomson's Observations on Lithotomy; Edinb.* 1808. *Allan's Treatise on Lithotomy; Edinb.* 1808. *Earle's Practical Observations on the Stone;* 1796. *Edit 2. Œuvres Chirurgicales de Desault par Bichat; tom. 2.*—For a minute description and delineations of the parts concerned in the operation, see *Camper's Demonstrationes Anatomico-pathologicæ, lib. 2.*

LOTION, (from *lavo*, to wash.) *Lotio.* An external fluid application. Lotions are usually applied by wetting linen in them, and keeping it on the part affected.

The following are some of the most useful in the practice of surgery.

LOTIO ALUMINIS.—℞. Aluminis purif. ℥ss. Aquæ distillatæ ℔j. Misce.—Sometimes used as an astringent injection; sometimes as an application to inflamed parts.

LOTIO AMMONIÆ ACETATÆ.—℞. Aquæ ammon. acetatæ; Spirit. vin. rectif.; Aquæ distillatæ; sing. ℥iv. Misce.—Properties discutient.

LOTIO AMMONIÆ MURIATÆ.—℞. Ammon. muriatæ ℥j. Spirit. rorismarini ℔j.—Has the same virtues as the preceding. Justamond recommended it in the early stage of the milk-breast.

LOTIO AMMONIÆ MURIATÆ CUM ACETO.—℞. Ammon. Mur. ℥ss. Aceti, Spirit. vinos. rectif. sing. ℔j. Misce. This is one of the most efficacious discutient lotions. It is, perhaps, the best application for promoting the absorption of extravasated blood, in cases of ecchymosis, contusions, sprains, &c.

LOTIO AMMONIÆ OPIATA.—℞. Spiritus ammon. comp. ℥iiiss. Aquæ distillatæ ℥iv. Tinct. Opii ℥ss. Misce.—Applied by Kirkland to some suspicious swellings in the breast, soda and bark being also given internally.

LOTIO CALCIS COMPOSITA.—℞. Aquæ calcis ℔j. Hydrargyri muriati ℥j. Misce.—Properties strongly astringent. Ring-worms, tetters, and some other cutaneous affections yield to this application, which, however, should generally be diluted. In the latter state, it may occasionally be used as an injection for various purposes.

LOTIO GALLÆ.—℞. Gallarum contusarum ℥ij. Aquæ ferventis ℔j. To be macerated one hour, and strained.—This astringent lotion is sometimes used with a view of removing the relaxed state of the parts, in cases of prolapsus ani, prolapsus uteri, &c.

LOTIO HYDRARGYRI AMYGDALINA.—℞. Amygdalarum amararum ℥ij. Aquæ distill. ℔ij. Hydrarg. mur. ℈j. Rub down the almonds with water, which is to be gradually poured on them; strain the liquor, and then add the muriated mercury. This will cure several cutaneous herpetic affections.

LOTIO HYDRARGYRI MURIATI. ℞. Hydrargyri muriati gr. ijss. Arabici gummi ℥ss. Aquæ distillatæ ℔j. Misce. —This is the injection of corrosive sublimate in use at St. Bartholomew's Hospital.

LOTIO HYDRARGYRI MURIATI COMPOSITA.—℞. Hydrarg. mur. gr. x. Aq. distillat. bullientis ℥iss. Tinct. canthar. ℥ss. Misce.—This was ordered by Dr. H. Smith, to be applied every night to scrophulous swellings.

LOTIO HELLEBORI ALBI.—R. Decocti hellebori albi ℔j. Kali sulphurari ℥ss. Misce.—This is occasionally employed as an application for curing tinea capitis, and some other cutaneous diseases

LOTIO KALI SULPHURATI.—℞. Kali sulph. ℥ij. Aquæ distill. ℔j. Misce —It is used in the same cases as the preceding one.

LOTIO LITHARGYRI ACETATI. ℞. Aquæ litharg. acet. ℥ij. Aq. distill. ℔ij. Spirit. vinos. tenuioris ℥ij. The first and the last ingredients are to be mixed before the water is added.

This is the common whitewash, an application, that is so universally known as the usual saturnine application in cases of inflammation, &c. that we need say nothing more concerning it.

LOTIO OPII.—℞. Opii purif. ℥jss. Aquæ distillatæ ℔j. Misce.—A very excellent application to irritable painful ulcers of every description. It is best to dilute it, especially, at first.

LOTIO PICIS.—℞. Picis liquidæ ℥iv. Calcis ℥vj. Aquæ ferventis ℔iij —To be boiled till half the water is evaporated. The rest is then to be poured off for use. This application is sometimes employed for the cure of tinea capitis; it is also of singular service in removing an extensive scorbutic redness, frequently seen on the legs, together with old ulcers.

LOTIO ZINCI VITRIOLATI.—℞. Zinci Vitriolati ℥j. Aq. ferventis ℔j. Misce. This is sometimes used by practitioners in lieu of the lotio aq. litharg. acet. The free external application of lead has sometimes been suspected of bringing on bad effects, in consequence of absorption; and some surgeons, therefore, advise the employment of this lotion instead of it, which, in all probability, also, is equally efficacious. When diluted, by adding two pints more water, it forms the common injection, so much recommended in cases of gonorrhœa.

LUES VENEREA. *Venereal disease.*—See this article.

LUMBAR ABSCESS. *Psoas Abscess.* By these terms are understood chronic collections of matter, which form in the cellular substance of the loins, behind the peritonæum, and descend in the course of the psoas muscle. Patients, in the incipient stage of the disease, cannot walk so well as usual; they feel a degree of uneasiness about the lumbar region; but in general, there has been no acute pain, even when the abscess has acquired such a size as to form a large tumour, protruding externally. In short, the psoas abscess is the best instance, which can possibly be adduced, in order to illustrate the nature of those collections of matter, which are called chronic, and which form in an insidious manner, without serious pain, or any other attendant of acute inflammation.

The abscess sometimes forms a swelling above Poupart's ligament; sometimes below it; and frequently the matter glides under the fascia of the thigh. Occasionally, it makes its way through the sacro-ischiatic foramen, and assumes rather the appearance of a fistula in ano. When the matter gravitates into the thigh, beneath the fascia, Mr. Hunter would have termed it a disease *in*, not *of*, the part. The uneasiness in the loins, and the impulse communicated to the tumour by coughing, evince, that the disease arises in the lumbar region; but, it must be confessed, that we can hardly ever know the existence of the disorder, before the tumour, by presenting itself externally, leads us to such information. The lumbar abscess is sometimes connected with diseased vertebræ, which may either be a cause, or an effect, of the collection of matter.—The disease, however, is frequently unattended with this complication.

The disease of the spine, we may infer, is not of the same nature as that treated of by Pott, as there is usually no paralysis. When the bodies of patients with lumbar abscesses are opened, it is found, that the matter is completely enclosed in a cyst, which, in many cases, is of course, very extensive. If the contents of such abscesses were not circumscribed by a membranous boundary in this manner, we should have them spreading among the cells of the cellular substance, just like the water in anasarca. The cysts are both secreting and absorbing surfaces, as is proved by the great quantity of matter, which soon collects again after the abscess has been emptied, and by the occasional disappearance of large palpable collections of matter of this kind, either spontaneously, or in consequence of means which are known to operate by exciting the action of the absorbents. In short, the cyst becomes the suppurating surface, and suppuration is now well ascertained to be a process, similar to glandular secretion. While the abscess remains unopened, its contents are always undergoing a change; fresh matter is continually forming, and a portion of what was in the

cyst before, is undergoing an incessant removal by the absorbents. This is not peculiar to lumbar abscesses; it is common to all, both chronic and acute, buboes and suppurations in general. It is true, that, in acute abscesses, there often has not been time for the formation of so distinct a membrane as the cyst of a large chronic abscess; but its matter is equally circumscribed by the cavities of the cellular substance being filled with a dense coagulating lymph; and though it generally soon makes way to the surface, it also is occasionally absorbed.

The best modern surgeons, make it a common maxim to open very few acute abscesses; for, the matter naturally tends with great celerity to the surface of the body, where ulceration allows it to escape spontaneously; after which, the case generally goes on better, than if it had been opened by art. But, in chronic abscesses, the matter has not that strong tendency to make its way outward; its quantity is continually increasing; the cyst is, of course, incessantly growing larger and larger; in short, the matter, from one ounce, often gradually increases to the quantity of a gallon. When the disease is at length opened, or bursts by ulceration, the surface of the cysts, irritated by the change, inflames; and its great extent, in this circumstance, is enough to account for the terrible constitutional disorder, and fatal consequences, which too frequently soon follow the evacuation of the contents of such an abscess. Hence, in cases of chronic suppurations of every kind, and not merely in lumbar ones, it is the surgeon's duty to observe the opposite rule to that applicable to acute cases: and he is called upon to open the collection of matter, as soon as he is aware of its existence, and its situation will allow it to be done.

Certainly, it would be highly advantageous to have some means of ascertaining whether the vertebræ are also diseased; for, as in this instance, the morbid bones would keep up suppuration, until their affection had ceased, and there would be no reasonable hope of curing the abscess sooner, it might be better to avoid puncturing it under such circumstances. The propriety of this conduct seems the more obvious, as issues, which are the means most likely to stop and remove the disease of the spine, are also such as afford most chance of bringing about the absorption of the abscess itself. However, if the collection cannot be prevented from discharging itself, and ulceration is at hand, it is best to meet the danger, make an opening with a lancet, in a place at some distance from where the pointing threatens, and afterwards heal it, in the way we shall presently detail.

Though we have praised the prudence of opening all chronic abscesses while small, the deep situation of the lumbar one, and the degree of doubt always involving its early state, unfortunately prevent us from taking this beneficial step in the present case. But, still the principle is equally praiseworthy, and should urge us to open the tumour as soon as the fluctuation of the matter is distinct, and the nature of the case is evident. For this purpose, Mr. Abernethy employs an abscess lancet, which will make an opening large enough for the discharge of those flaky substances so frequently found blended with the matter of lumbar abscesses, and by some conceived to be an emblem of the disease being scrophulous. Such flakes seem to consist of a part of the coagulating matter of the blood, and are very commonly secreted by the peculiar cysts of scrophulous abscesses. The puncture must also be of a certain size, to allow the clots of blood, occasionally mixed with the matter, to escape. Mr. Abernethy considers the opening of a lumbar abscess, a very delicate operation. Former surgeons used to make large openings in these cases; let out the contents; leave the wound open; the usual consequences of which were, great irritation and inflammation of the cyst; immense disturbance of the constitution; putrefaction of the contents of the abscess, in consequence of the entrance of air into its cavity; and, too often, death. While such practice prevailed, very few afflicted with lumbar abscesses, were fortunate enough to escape. The same alarming effects resulted from allowing the abscess to attain its utmost magnitude, and then burst by ulceration. If then a more happy train of events depend upon the manner, in which lumbar abscesses are punctured, the operation is certainly a matter of great delicacy.

Until the collection is opened, or bursts, the patient's health is usually little, or not at all impaired; indeed, we see in the faces of many persons with such abscesses, what is usually understood by the picture of health. Hence, how likely our professional conduct is to be arraigned, when great changes for the worse, and even death, occur very soon after we have let out the matter, seemingly, and truly, in consequence of the operation. Every plan, therefore, which is most likely to prevent these alarming effects, is entitled to infinite praise; and such, I conceive, is the practice recommended by Mr. Abernethy.

This gentleman's method is to let out the matter, and heal the wound immedi-

ately afterwards by the first intention. He justly condemns all introductions of probes, and other instruments, which only irritate the edges of the puncture, and render them unlikely to grow together again. The wound is to be carefully closed with sticking plaster, and it will almost always heal.

Doing this, does not put a stop to the secretion of matter within the cavity of the abscess. Of course, a fresh accumulation takes place; but, it is obvious that the matter, as fast as it is produced, will gravitate to the lowest part of the cyst, and, consequently, the upper part will remain for a certain time undistended, and have an opportunity of contracting.

When a certain quantity of matter has again accumulated, and presents itself in the groin, or elsewhere, which may be in about a fortnight after the first puncture, the abscess is to be punctured again, in the same manner as before, and the wound healed in the same way. The quantity of matter will now be found much less, than what was at first discharged. Thus the abscess is to be repeatedly punctured at intervals, and the wounds as regularly healed by the first intention, by which method, irritation and inflammation of the cyst will not be induced, the cavity of the matter will never be allowed to become distended, and it will be rendered smaller and smaller, till the cure is complete.

In a few instances, you may, perhaps, be unable to persevere in healing the repeated punctures it may be necessary to make; but, after succeeding once or twice, the cyst will probably have enjoyed sufficient opportunity to have contracted itself so much, that its surface will not now be of alarming extent. It is also a fact, that the cyst loses its irritability, and becomes more indolent, and less apt to inflame, after the contents have been once or twice evacuated, in the above way. Its disposition to absorb becomes also stronger.

The knowledge of the fact, that the cysts of all abscesses are absorbing surfaces, should lead us never to neglect other means, which Mr. Abernethy suggests, as likely to promote the dispersion of the abscess, by quickening the action of the absorbents. Blisters kept open with savine cerate, issues, electricity, occasional vomits of zincum vitriolatum, are the means most conducive to this object. When the vertebræ are diseased, issues are doubly indicated.

In the latter complication, the case is always dangerous. If an opening should have been made in the abscess, the cyst is at first more likely to be irritated, than when the bones are not diseased, and the affection of the spine is rendered much less likely to undergo any improvement, in consequence of the mere formation of an outward communication. The same bad effect attends necrosis; in which case, the absorption of the dead bone is always retarded by the presence of unhealed fistulæ and sores, which lead down to the disease.

Mr. Crowther has succeeded in dispersing some large lumbar abscesses without opening them. Large blisters, applied to the integuments covering the swelling, and kept open with the savine cerate, effected the cure. When this gentleman punctures such collections of matter, he uses a small trocar, which he introduces at the same place as often as necessary. He observes, that the aperture so made does not ulcerate, and allows no matter to escape after being dressed. I cannot, however, discover any reason for his preferring the trocar to the abscess lancet, except that the cannula enables the surgeon to push back with a probe any flakes of lymph, &c. which may obstruct its inner orifice. But, this is scarcely a reason, when Mr. Abernethy informs us, that the opening, made with an abscess lancet, is large enough to allow such flakes to be discharged; and, when they stop up the aperture, a probe might also be employed to push them back. A wound made with a cutting instrument will, *cæteris paribus*, always more certainly unite, by the first intention, than one made with such an instrument as a trocar. Mr. Crowther may have succeeded in always healing the aperture; but, I do not believe, that other practitioners would experience equal success. Were the tumour not very prominent, from the quantity of matter being small, suddenly plunging in a trocar might even endanger parts, which should, on no account, be injured.

Some writers recommend opening lumbar abscesses with a seton. The matter being made to form as prominent a swelling as possible, by pressing the abdomen, and putting the patient in a position, which will make the contents of the abscess gravitate towards the part where the seton is to be introduced, a transverse cut is first to be made in the integuments down to the fascia. A flat trocar is next to be introduced within the incision, which should only be just large enough to allow the instrument to pass freely up under the skin, for at least three quarters of an inch; when the hand is to be raised, and the trocar pushed obliquely and gently upwards, till the cannula is within the lower part of the sac. The trocar must now be with-

drawn, and the matter allowed to flow out gently, stopping it every now and then for some minutes. The assistant must now withdraw his hand, to take away the pressure, and the thumb of his left hand upon the opening of the cannula, holding it between his fore and middle fingers. It must then be pushed upward, nearly to the top of the tumour, where its end may be distinctly felt with the fore-finger of the right hand. As soon as it can be plainly felt, it must be held steadily in the same position, and the trocar is to be introduced into it again, and pushed through the skin, at the place where it is felt, and the cannula along with it. The trocar being next withdrawn, a probe, with a skein of fine soft silk, dipped in oil, must be passed through the cannula, which being now taken away, leaves the seton in its place. A pledget of a mild ointment is then to be applied over the two openings, the more completely to exclude the air. A fresh piece of the silk is to be drawn into the abscess, and that which was in before, cut off, as often as necessary. (See *Latta's System of Surgery, Vol.* 3. *p.* 307.)

Mr. Crowther states, that Deckers, who wrote in 1696, discharged a large abscess, in a gradual manner, with a trocar, the cannula of which was not withdrawn, but was stopped up with a cork, and the latter let out at intervals. B. Bell also advises the cannula not to be taken out.

I cannot quit this subject without mentioning a remarkable case of lumbar abscess, which I lately saw in Christ's Hospital, under the care of Mr. Ramsden. The tumour extended from the ilium and sacrum below, as high up as the ribs. The diameter of the swelling, from behind forward, might be about six or eight inches. It was attended with so strong a pulsation, corresponding with that of the other arteries, that several eminent surgeons in this city considered the case as an aneurism of the aorta. After some weeks, as the tumour increased in size, the throbbing of the whole tumour gradually became fainter and fainter, and, at length, could not be felt at all. The tumour was nearly on the point of bursting. Mr. Ramsden suspected, that it was an abscess, and determined to make a small puncture in it. The experiment verified the accuracy of his opinion; a large quantity of pus was evacuated at intervals; but, the boy's health suffering, he went to his friends at Newbury, and I have not yet heard the event. I have never seen any popliteal aneurism, whose pulsations could be more plainly seen and strongly felt, than those of the abscess we have just been describing. The rationale I must leave to the speculative reader.

I shall conclude with expressing my decided preference to Mr. Abernethy's plan of treating lumbar abscesses.

Consult *Abernethy's Surgical and Physiological Essays, Part* 1. *and* 2. *Crowther's Observations on White Swelling, &c.* 1808. *Latta's System of Surgery, Vol.* 3.

LUNAR CAUSTIC. See *Argentum Nitratum.*

LUXATION, (from *luxo*, to put out of joint.) A dislocation. See this word.

M.

MAMMA, REMOVAL OF. The operation of cutting away a diseased breast, is done nearly in the same manner as the removal of tumours in general, and is indicated whenever the part is affected with an incurable disease, which admits, however, of being entirely removed with the knife. When the breast is affected with scirrhus, or ulcerated cancer, the imprudence of tampering with the disease cannot be too severely censured. Were the disorder unattended with a continual tendency to increase, some time might properly be dedicated to the trial of the internal remedies, and external applications, which, have acquired any character for doing good in these unpromising cases. But, unfortunately, by endeavouring to cure the disease by medicine, we only afford time for it to increase in magnitude, and, at length, to attain a condition, in which even the knife cannot be employed so as to take away the whole of the diseased parts. When the case is marked by those characteristic features, of scirrhus, which are noticed in the article *Cancer*, the sooner the tumour is cut out, the better. There are also some malignant kinds of sarcoma, to which the female breast is subject, (as will be explained in the article *Tumour*,) which cannot be removed at too early a period after their nature is suspected, or known. Indeed, though there is not equal urgency for the operation when the tumour is only an indolent,

simple, fatty, or sarcomatous disease, yet, as all these tumours are continually growing larger, and little success attends the attempt to disperse them, the practitioner should never devote much time to the trial of unavailing medicines and applications, and let the swelling attain a size, which would require a formidable operation for its excision. Besides, every simple, fleshy, or fatty tumour, is always accompanied with a certain hazard of changing into a malignant, or cancerous one.

Certainly, there are many swellings and indurations of the breast, which it would be highly injudicious and unnecessary to extirpate, because they generally admit of being discussed. Such are many tumours, which are called *scrophulous*, from their affecting patients of this peculiar constitution; such are nearly all those indurations, which remain after a sudden and general inflammatory enlargement of the mamma; such are most other tumours, which acquire their full size in a few days, attended with pain, redness, &c.; and, of this kind, also, are the hardnesses in the breast, occasioned by the mammary abscess.

In the removal of all tumours, their malignant or cancerous nature makes it necessary to observe one important caution in the operation, viz. not to rest satisfied with cutting away the tumours just at their circumference; but to take away also a considerable portion of the substance, in which they lie, and with which they are surrounded. In cutting out a cancerous breast, if the operator were to be content with merely dissecting out the disease, just where his eyes and fingers might equally lead him to suppose its boundary to be situated, there would still be left behind white diseased bands, which radiate from the tumour into the surrounding fat, and which would inevitably occasion a relapse. In a vast proportion of the cases also, in which cancer of the breast unfortunately recurs after the operation, it is found, that the skin is the part, in which the disease makes its reappearance. Hence, the great prudence of taking away a good deal of it in every case suspected to be a truly scirrhous or cancerous disease. This may also be done so as not to prevent the important objects of uniting the wound by the first intention, and covering the whole of its surface with sound integuments. So frequently does cancer recur in the nipple, whenever it does recur any where, that many of the best modern operators always make a point of removing this part in every instance, in which it is judged expedient to take away any portion of the skin at all. The surgeon, indeed, would be inexcusable, were he to neglect to take away such portion of the integuments covering scirrhous tumours, as is evidently affected, appearing to be discoloured, puckered, and closely attached to the diseased lump beneath. Nor should any gland, in the axilla, at all diseased, nor any fibres of the pectoral muscle, in the same state, be ever left behind. There is no doubt, that nothing has stamped operations for cancers with disrepute, so much as the neglect to make a free removal of the skin, and parts surrounding every side of the tumour. Hence the disease has frequently appeared to recur, when, in fact, it had never been thoroughly extirpated; the disease, though entirely a local affection, has been deemed a constitutional one: and the operation frequently rejected as ineffectual and useless.

But, strongly as I have urged the prudence, the necessity of making a free removal of the skin covering, and of the parts surrounding, every cancerous or malignant tumour, the same plan may certainly be regarded as unnecessary, and, therefore, unscientific, in most operations for the removal of simple, fatty, or fleshy tumours. However, even in the latter cases, when the swelling is very large, it is better to take away a portion of skin; for, otherwise, after the excision of the tumour, there would be a redundance of integuments, the cavity of which would only serve for the lodgment of matter. The loose superfluous skin also would lie in folds, and not apply itself evenly to the parts beneath, so as to unite favourably by the first intention; nor could the line of the cicatrix itself be arranged with such nice evenness as it might be, were a part of the redundant skin taken away at the time of operating.

The best method of removing a diseased breast is as follows: The patient is usually placed in a sitting posture, well supported by pillows and assistants; but the operator would find it equally convenient, if not more so, to remove the tumour with his patient in a recumbent position; and it certainly is better whenever the operation is likely to be long, or much blood to be lost, which circumstances are very apt to bring on fainting. I remember, that Mr. Abernethy, in his lectures, used to recommend the latter plan; which, however, without the sanction of any great name, or authority, possesses such obvious advantages, as will always entitle it to approbation.

The arms should be confined back, by placing a stick between them and the body, by which means, the fibres of the great pectoral muscle will be kept on the stretch, a state most favourable for the dissection of the tumour off its surface. The stick also prevents the patient from

moving her arm about, and interrupting the progress of the operation.

When the tumour is not large, and only a simple sarcoma, free from malignancy, it will be quite unnecessary to remove any of the skin, and, of course, this need only be divided by one incision, of a length proportionate to the tumour. The cut must be made with a common dissecting knife; and, as the division of the parts is chiefly accomplished with the part of the edge towards the point, the instrument will be found to do its office best when the extremity of the edge is made of a convex shape, and this part of the blade is turned a little back, in the way in which dissecting knives are now often constructed. The direction of the incision through the skin should be made according to the greatest diameter of the tumour to be removed, by which means it will be most easily dissected out.

The direction of the incision is various with different practitioners; some making it perpendicular, others transverse. In general, the shape of the tumour must determine which is the best. In France, it has been said, that when the incision follows the second direction, it heals more expeditiously, because the skin is more extensible from above downward, than laterally, particularly towards the sternum, and, consequently allows the sides of the wound the more readily to be placed in contact; and that the action of the pectoral muscle tends to separate the edges of the wound when it is perpendicular. On the other hand, it is allowed, that the wound, made in the latter manner, is the most favourable for the escape of the discharge, if suppuration should occur. (See *Desault par Bichat, p.* 312. *Tom.* 2.)

The cut through the skin should always be somewhat longer than the tumour; and as it is, perhaps, the most painful part of the operation, and one attended with no danger whatever, it should be executed with the utmost celerity. Pain is certainly more or less to be dreaded, according to its duration. The fear, however, of giving pain has probably led many operators to err, by not making their first incision through the integuments large enough, the consequence of which has often been, that there was not room enough to get at the tumour so as to dissect it out with facility; the patient has been kept nearly an hour in the operating room, instead of five minutes, and the surgeon censured by the spectators, as awkward and tedious. It is clear, also, that, besides the great deal more blood lost, from this error, than would otherwise happen, the vessels being commonly not tied till all the cutting is finished, the avoidance of pain, that fear, which led to the blunder, is not effected, and the patient suffers much more, and for a much longer time, in consequence of the embarrassment and obstacles in the way of the whole operation.

When the disease is of a scirrhous or malignant nature, the skin covering the tumour should, at all events, be in part removed. As I have said before, all that portion which is discoloured, puckered, tuberculated, or otherwise altered, should be taken away. Some must also be removed, in order to prevent a redundance, in all cases in which the tumour is large. We have said too, that in cases of scirrhus and cancer of the breast, the nipple is considered a dangerous part to be left behind. For the purpose of removing the necessary portion of skin, the surgeon must obviously pursue a different mode from that above described; and, instead of one straight incision, he is to make two semicircular ones, one immediately after the other, and which are to meet at their extremities. The size of these wounds must be determined by that of the disease to be removed, and by the quantity of skin, which it is deemed prudent to take away; for the part, which is included in the two semicircular cuts, is that which is not to be separated from the upper surface of the swelling, but taken away with it. The shape of the two cuts together may approach that either of a circle or oval, as the figure of the tumour itself may indicate, as most convenient. The direction of the incisions is to be regulated by the same consideration.

In the above ways, the first division of the integuments is to be made in removing tumours of every description, covered with skin. The same principles and practice should prevail in all these operations; and, whether the swelling is the mamma, or any other diseased mass, whether situated on the chest, the back, the head, or extremities, the same considerations should always guide the operator's hand.

The incision, or incisions, in the skin having been made, the next object is to detach every side of the tumour from its connexions, and the separation of its base will then be the last and only thing remaining to be done. When the tumour is a scirrhus, or other malignant disease, the operator must not dissect close to the swelling, but make his incisions on each side, at a prudent distance from it, so as to be sure to remove, with the diseased mass, every atom of morbid mischief in its vicinity. But, when the tumour is only a mere fatty, or other mass, perfectly free from malignancy, the cellular bands and vessels forming its connexions, may be divided close to its circumference. It is astonishing with what ease fatty tumours are removed, after the necessary division is made in the skin; they may almost be turned out with the fingers, without any

cutting at all. When they have been inflamed, however, they are then more adherent to the surrounding parts.

Thus we see, that the first stage of the operation of removing a tumour, is the division of the skin; the second, the separation of the swelling from the surrounding parts on every side; the third and last stage is the division of the parts to which its under surface, or base, is attached. The latter object should be accomplished by cutting regularly from above downward, till every part is divided.

It is a common thing to see many operators constantly embarrassed and confused, whenever they have to remove a large tumour, on account of their having no particular method in their proceedings. They first cut a few fibres on one side, then on another; and, turning the mass of disease now to this side, now to that, without any fixed design, they both prolong the operation very tediously, and present to the bystanders a complete specimen of surgical awkwardness. On the contrary, when the practitioner divides the cutting part of the operation into the three methodical stages, above recommended, in each of which there is a distinct object to be fulfilled, he proceeds with a confidence of knowing what he is about, and soon effects what is to be done, with equal expedition and adroitness.

Having taken out the tumour, the operator is immediately to tie such large vessels as may be pouring out their blood; indeed, when the removal of the swelling will necessarily occupy more than three, or four minutes, it is better to tie all the large arteries as soon as they are divided, and then proceed with their dissection. This was the celebrated Desault's plan, and it is highly deserving of imitation in this country, not only because many subjects cannot afford to lose much blood, but also because the profuse effusion of this fluid keeps the operator from seeing what parts he is dividing.

The largest arteries being tied, the surgeon should not be immediately solicitous about tying every bleeding point which may be observed. Instead of this, let him employ a little while in examining every part of the surface of the wound, in order to ascertain that no portion of the swelling, no hardened lump, nor diseased fibres remain behind. Even if any part of the surface of the pectoral muscle should present a morbid feel, or appearance, it must, on every account, be cut away. Also, if any of the axillary glands are diseased, the operator should now proceed to remove them. After the time spent in such measures, many of the small vessels, which bled just after the excision of the swelling, will now have stopped, the necessity for several ligatures will be done away, and, of course, the patient saved a great deal of pain, and more of the wound be likely to heal by the first intention.

Some information may be derived, respecting whether any of the tumour is left behind, by examining its surfaces, when taken out, and observing whether any part of them is cut off; for, if it is, it may always be found in the corresponding part of the wound.

The axillary glands may always be taken out, without the least risk, if the plan pursued by Desault in France, and Sir Charles Blicke, and other eminent surgeons in this country, be adopted. The method alluded to, is, after dividing the skin covering the gland, and freeing the indurated part from its lateral connexions, to tie its root, or base, with which it is connected with the parts on the side towards the cavity of the axilla. Then the indurated gland itself may be safely cut off, just above the ligature. Were the gland cut off in the first instance, the artery which supplies it with blood, would be exceeding difficult to tie, on account of its deep situation; and, by reason of its shortness and vicinity to the heart, it would bleed almost like a wound of the thoracic artery itself. In this way, there is also not the least hazard of injuring the latter vessel. It would be a great improvement in the mode of operating for the removal of these glands, if surgeons were always to make the patient lie down, with the arm placed in such a position as would let the light fall into the axilla. How much the steps of the operation would be facilitated in this way, I need not attempt to explain.

The above directions will enable a surgeon to remove tumours in general. They apply also in a great measure to *encysted tumours;* but, a few particular rules how to operate in the latter cases, will be found in that article. One half of each ligature is always to be cut off before dressing the wound. The edges of the incision are to be brought together with strips of adhesive plaster; and, before this can be done with ease, the stick confining the arm back must be removed, and the os brachii brought forward, so as to relax the pectoral muscle, and integuments of the breast. No sutures should ever be employed, as they are useless, painful, and irritating. The wound being closed with sticking plaster, and a pledget of simple cerate, a compress of folded linen, or flannel, may be put over the dressings; these are to be secured with a broad piece of linen, which is to encircle the chest, be fastened with pins, or stitches, and kept from slipping down by two tapes, one of which is to go from behind forward, over each shoulder, and be

stitched to the upper part of the bandage, both in front and behind. The arm on the same side as that on which the operation has been done, should be kept perfectly motionless, in a sling; every motion of the limb must evidently disturb the wound, by putting the great pectoral muscle into action, or rendering its fibres sometimes tense, sometimes relaxed. It is scarcely necessary to say, that, after so considerable an operation as the removal of a large breast, or any other tumour of magnitude, the patient should be given about thirty drops of the tinctura opii. A smaller dose always creates restlessness, head-ach, and fever, after operations, instead of having the desired effect.

Here it becomes me to state, that as I could not find, in any surgical book, with which I am acquainted, what I conceived to be a proper description of the mode of removing a diseased breast, and tumours in general, the foregoing remarks are given chiefly on my own authority. Whether they are just, or not, must be decided by the profession.

The principal writers on the removal of the mamma are, Garengeot, Dionis, Le Dran, Bertrandi, Sharp, and Sabatier, in their respective treatises on the operations. B. Bell, Latta, &c. have also treated of the subject in their Systems of Surgery; and there is a memoir *Sur l'Opeation du Cancer au Sein*, in *Les Œuvres Chirurgicales de Desault par Bichat, Tom.* 2.

MAMMARY ABSCESS. *Milk Abscess.* Women who suckle, are particularly subject to inflammation and suppuration in the breast. The part enlarges, becomes tense, heavy, and painful. The integuments of the breast sometimes assume an uniform redness; sometimes they are only red in particular places. The inflammation may affect the mammary gland itself, or be confined to the skin and surrounding cellular substance. In the latter case, the inflamed part is equally tense; but, when the glandular structure of the breast is also affected, the enlargement is irregular, and seems to consist of one or more large tumours, situated in the substance of the part. The pain often extends to the axillary glands. The secretion of the milk is not always suppressed, when the inflammation is confined to the integuments, and suppuration is said to come on more quickly, than in affections of the mammary gland itself. When the symptoms of inflammation continue to increase for four or five days, suppuration may be expected; unless the progress of the inflammation be slow, and its degree moderate, in which circumstances, resolution may often be obtained, even as late as a fortnight after the first attack. Inflammations of the breast, are almost always attended with symptoms of the sympathetic inflammatory fever. (See *Fevers, Surgical.*) I think authors err, who describe the febrile disorder as generally preceding the local complaint.

Women are most liable to mammary abscesses within the first three months after parturition; but they are also very much exposed to the disorder as long as they continue to suckle.

The most common causes occasioning the mammary abscess, as enumerated by writers in general, are, repressing the secretion of milk at an early period, mental disturbance, fright, &c.; exposure to cold, moving the arms too much while the breasts are very large and distended, bruises, and other external injuries. The causes are not always assignable.

The matter is sometimes contained in one cyst, or cavity, sometimes in several; but the abscess generally breaks near the nipple.

As all inflammations of the mamma are attended with considerable induration, these cases should be carefully distinguished from other swellings of a more incurable kind. It is said, that scrophulous tumours of the mamma, which have existed a long while, often disappear after the occurrence of a milk-abscess. Women who have never been pregnant, are sometimes affected with suppurations in the breast, not essentially different from those above described. Even men are said to be liable to similar complaints.

In the early period of the affection, resolution should be attempted. The following are the principal means for this purpose:—topical blood-letting, saline purges, low diet, keeping the inflamed breast from hanging down, gentle friction of the breast, with a soft sponge, wet with some warm emollient liquor, having the milk tenderly sucked out at proper intervals; saturnine applications, or lotions containing sal ammoniac.

When matter cannot be prevented from forming, an emollient poultice is the best application, and the abscess should in general be allowed to break of itself, unless of a somewhat chronic nature, in which case, it should be opened in a depending part, with a lancet. Sinuses sometimes form, in consequence of abscesses in the breast, and will not heal till freely opened with a director and curved bistoury. When the cavity of the abscess begins to fill up with granulations, the poultice may be left off, and superficial dressings applied.

The indurations, often remaining in the breast, in consequence of acute inflammation and abscesses, generally yield to frictions with camphorated mercurial ointment, the application of a piece of soap-plaster, and giving calomel, cicuta, and, as some advise, emetics.

Mr. Hey describes a very deep-seated abscess of the breast, not of frequent occurrence, and not confined to pregnant nor suckling women. Its situation renders all superficial applications ineffectual. The inflammatory stage is tedious; and when the matter has made its way outward, the discharge continues, and there is no tendency to healing. Sometimes the matter lodges behind the mamma, as well as in the substance of the gland, and breaks out in different places, the intermediate parts of the breast feeling as if affected with a scirrhous hardness. There are numerous sinuses running in different directions, and, when opened, a soft purple fungus appears within them. The disease goes on in this state, for a long while, keeping up hectic symptoms.

Mr. Hey's practice is to trace the course of all the numerous sinuses, and lay them open, and unless this is done, with respect to every one of them, the cure cannot be accomplished. If he finds any two sinuses running in such directions, that when fully opened, they leave a small part of the mamma in a pendulous state, he removes such part entirely. As the sinuses are filled with fungus, their continuations present no visible cavity, and can only be detected by the greater softness of parts of the wound, where, on breaking down the fungus, the orifice of the collateral sinus may be found. Mr. Hey has found, that even in the most unfavourable subjects, the wounds heal quickly, and the natural shape of the breast is preserved.

Consult *Pearson's Principles of Surgery, Chap.* 3. *Hey's Practical Observations, p.* 504. *Kirkland* has also treated of several kinds of abscesses of the breast, in his *Enquiry into the Present State of Medical Surgery, Vol.* 2. *p.* 161. The German reader may refer to *Richter's Anfangsgr. der Wundarzn. Band.* 4. *Chap.* 16.

MARASMUS. (from μαραινω, to grow lean.) An atrophy, or wasting of the bulk and strength.

MATURANTIA. (from *maturo*, to ripen.) Medicines for promoting suppuration.

MATURATION. (Same derivation.) *Maturatio.* The old surgeons were accustomed to call the completion of the suppurative process in inflammatory tumours their *maturation*, in which state they were demed fit to be opened. The word is still frequently found in modern surgical works.

MELICERIS. (from μελι, honey, and κηρος, wax.) A tumour of the encysted kind, filled with a substance resembling wax and honey in consistence. (See *Tumours, Encysted.*)

MENINGES. (from μενω, to remain.) The membranes covering the brain.

MENINGOPHYLAX. (from μηνιγξ, a membrane, and φυλασσω, to guard.) An instrument used by the ancients for guarding the dura mater and brain from injury, in their mode of trepanning. It seems to have been something like the lenticular, only its blade was completely round, without an edge. It ended in a lentiform cup, like the latter. (*Encyclopedie Méthodique, Partie Chirurgicale.*) Pott gives a little engraving of a meningophylax, which resembles a common elevator. (See *Vol.* 1. *of his Works.*)

MERCURY. (*Quicksilver. Mercurius. Hydrargyrus.*) The medicinal virtues of this mineral were almost totally unknown to the ancients, who considered it as a poison. It was first employed for purposes of medicine by the Arabians, who made use of it in the form of ointments for the cure of certain diseases of the skin and the killing of vermin. In modern times, mercury is one of the most important articles of the materia medica. It has an advantage over all others in being a specific remedy for a disease, which tends more, than any other, to the destruction of the human species, and which, without this inestimable discovery, would probably have continued incurable to the present day.

Mercury, taken into the stomach in its metallic state, has no action on the body, except what arises from its weight, or bulk. It is not poisonous, as was vulgarly supposed, but perfectly inert. But, in its various states of combination, it produces certain sensible effects. It quickens the circulation, and increases all the secretions and excretions.

According to circumstances, the habit of the body of the patient, the temperature in which he is kept, the nature of the preparation, and the quantity in which it is exhibited, its effects are, indeed, various. Sometimes, it more particularly increases one secretion; sometimes another; but, its most characteristic effect is the increased flow of saliva, which it generally excites, if given in sufficient quantity. (*Edinb. Dispensatory.*)

FIRST ATTEMPTS TO ADMINISTER MERCURY.

It has been said, that the efficacy of mercury in curing the venereal disease was an accidental discovery; but, it seems more probable, that the good effects, which it produced in cutaneous diseases, first led physicians to make trial of it in the venereal one, which, frequently coming on with eruptions on the skin, ulcers, &c., seemed to present an analogy to the affections, in which mercury had already been found successful.

In the times immediately following the first origin of the venereal disease, prac-

titioners only ventured to employ this remedy with timorous caution, so that, of several of their formulæ, mercury scarcely composed a fourteenth part, and few cures were effected. On the other hand, the empirics, who noticed the little efficacy of these small doses, ran into the opposite extreme, and exhibited mercury in such large quantities, and with such little care, that most of their patients became suddenly attacked with a most violent salivation, frequently attended with very dangerous, and even fatal symptoms; or such, as after making them lose their teeth, left them pale, emaciated, exhausted, and subject, for the rest of their lives, to tremblings, or other more or less dangerous affections. From these two very opposite modes of practice, there originated such uncertainty, respecting what could be expected from mercury, and such fears of the consequences, which might result from its employment, that every plan was eagerly adopted, which offered the least chance of cure, without having recourse to this mineral.

A medicine, however, so powerful, and whose salutary effects were seen by attentive practitioners amid all its inconveniences, could not sink into oblivion. After efforts had been made to discover a substitute for it, and it was seen, how little confidence those means deserved, on which the highest praises had been lavished, the attempts to extend its utility were renewed. A medium was pursued, between the too timid methods of those physicians, who had first administered it, and the inconsiderate boldness of the empirics. Thus the causes, from which both parties failed, were avoided; the character of the medicine was revived in a more durable way, and, from this period, its reputation has always been maintained.

It was only about this epoch, that mercury began to be internally given: hitherto, it had only been externally employed, which was done in three manners. The first was in the form of an ointment or liniment: the second, as a plaster; and the third, as a fumigation.

The basis of the ointment, or liniment, was quicksilver, which was blended, by means of trituration, with hog's lard, goose's fat, &c. and composed scarcely one-sixth or one-eighth of the whole; a proportion, however, much greater, than what had been at first employed. But, from a fear, that the mineral might prove hurtful to the nerves, by the cold property, which they fancied it possessed, and that it might occasion numbness, tremblings, or palsies, they combined with it a multitude of ingredients of a warm, aromatic nature, or supposed to possess such; for example, oil of camomile, sesame-seeds, ani-seeds, the roots of zedoary, and the florentine iris, and a thousand other substances, which were incorporated with the ointment. The members, joints, and the whole of the body, except the head, belly, and chest, were rubbed with this composition; and the frictions were repeated, at suitable intervals, until obvious signs of salivation appeared.

The ingredients of the plasters resembled those of the ointments; only they contained less fat, for which was substituted a sufficient quantity of wax, to give them a proper consistence. This composition was applied to the skin, and they covered the whole body with it, excepting the same parts, on which they feared to put the ointments. The plasters were kept on, till salivation began to make its appearance.

The fumigations were made with quicksilver, triturated with turpentine, or saliva, or else with cinnabar. These substances were mixed with fatty, or resinous ones, such as myrrh, nutmeg, &c. and, all the ingredients being reduced to powder, were made into a paste, with a sufficient quantity of turpentine, or gum tragacanth. The patient was then placed in a box made on purpose, or under a little kind of tent, out of which the head was generally allowed to protrude. A chafing-dish, containing burning coals, was placed near his feet, and, every now and then, bits of mercurial paste were thrown into the vessel. The patient was left exposed to the fumes, which arose, until he broke out into a profuse perspiration, which they took great pains to keep up and increase, by putting him in a warm bed, loading him with bedding, for about two hours, after which he was rubbed quite dry, and given some food. This plan was persisted in every day, till a salivation was produced, which was kept up as long as necessary. The method by fumigation is described in Astruc, and particular preparations, and apparatuses for the purpose, have been since recommended by Lalonette in France, and, more recently, by Abernethy in England.

Of the three methods, which we have just described, only the first is at present much in use, and even this is very much altered. Experience evinced, not only, that the employment of mercurial plasters caused heat, redness, itching, and disagreeable eruptions, but, that the method was exceedingly slow and uncertain. Mercurial plasters are now only used as topical discutient applications to tumours, and indurations.

Fumigations, considered as the only means of cure, fell also into discredit, because, although they formed a method of applying mercury in a very active man-

ner, they were, as anciently managed, liable to several objections. In this way it was next to impossible to regulate the quantity of mercury used, which will necessarily vary, according to the greater, or lesser activity of the fire employed for making the fumigation, according to the position of the patient during the operation, and other circumstances. The effect of the vapour on the organs of respiration was often very hurtful, and mercury, applied in the way of fumigation, more frequently occasioned tremblings, palsies, &c. than in any other manner. In Mr. Abernethy's mode, however, fumigation is, under certain circumstances, not only an eligible, but, the very best, way of affecting the constitution, as we shall presently notice.

Frictions with ointment have always been regarded as the most efficacious. They have undergone considerable change, and, by being rendered more simple, have been greatly perfected. All the warm aromatic substances have been retrenched from the ointment, not only as useless, but, as irritating and inflaming to the skin. In modern times, the proportion of mercury to the fat has been very much increased.

GENERAL REMARKS ON THE ADMINISTRATION OF MERCURY, ITS OCCASIONAL CONSEQUENCES, &c.

With regard to the preparations of the medicine, and the modes of applying it, we are to consider two things; first, the preparation and mode attended with the least trouble, or inconvenience, to the patient; and secondly, the preparation, and mode of administering it, that most readily conveys the necessary quantity into the constitution. Mercury is carried into the constitution in the same way as other substances, either by being absorbed from the surface of the body, or that of the alimentary canal. It cannot, however, in all cases be taken into the constitution in both ways; for, sometimes the absorbents of the skin will not readily receive it, at least, no effect is produced, either on the disease, or constitution, from this mode of application. In this circumstance, mercury must be given by the mouth, although the plan may be very improper in other respects, and often inconvenient. On the other hand, the internal absorbents sometimes will not take up the medicine, or, at least, no effect is produced on the disease, or the constitution.

In such cases, all the different preparations of the medicine should be tried; for, sometimes one succeeds, when another will not. In some cases, mercury seems to have no effect, either applied outwardly, or taken into the stomach. Many surfaces seem to absorb mercury better, than others; such are probably all internal surfaces and sores. Thirty grains of calomel, rubbed in on the skin, have not more effect, than three, or four, taken by the mouth. Dressing small ulcers with red precipitate sometimes causes a salivation. (See *Hunter on the Venereal Disease*, *p.* 335, 336.)

Besides the practicableness of getting the medicine into the constitution in either way, it is proper to consider the easiest for the patient, each mode having its convenience and inconvenience, depending on the nature of the parts, to which it is applied, or on certain situations of life at the time. Hence, it should be given in the way, most suitable to such circumstances.

In many, the bowels can hardly bear mercury at all, and it should then be given in the mildest form possible, conjoined with such medicines, as will lessen, or correct its violent local effects, although not its specific ones on the constitution.

When mercury can be thrown into the constitution with propriety by the external method, it is preferable to the internal plan, because the skin is not nearly so essential to life as the stomach, and, therefore, is capable in itself of bearing much more, than the stomach. The constitution is also less injured. Many courses of mercury would kill the patient, if the medicine were only given internally, because it proves hurtful to the stomach and intestines, when given in any form, or joined with the greatest correctors. Every one, however, has not opportunities of rubbing in mercury, and is therefore obliged, if possible, to take it by the mouth. (*Hunter*, *p.* 338.)

Mercury has two effects, one as a stimulus on the constitution and particular parts; the other as a specific on a diseased action of the whole body, or of parts. The latter action can only be computed by the disease disappearing.

In giving mercury in the venereal disease, the first attention should be to the quantity, and its visible effects in a given time, which, when brought to a proper pitch, are only to be kept up, and the decline of the disease to be watched; for, by this we judge of the invisible, or specific effects of the medicine, and know what variation in the quantity may be necessary. The visible effects of mercury affect, either the whole constitution, or some parts capable of secretion. In the first, it produces universal irritability, making it more susceptible of all impressions. It quickens the pulse, increases its hardness, and occasions a kind of temporary fever. In some constitu-

tions, it operates like a poison. In some it produces a kind of hectic fever, that is, a small quick pulse, loss of appetite, restlessness, want of sleep, and a sallow complexion, with a number of consequent symptoms; but, such effects commonly diminish, on the patient becoming a little accustomed to the medicine. Mercury often produces pains like those of rheumatism, and nodes of a scrophulous nature. (*Hunter, p.* 339, 340.)

The quantity of mercury to be thrown into the constitution, for the cure of any venereal complaint, must be proportioned to the violence of the disease. However, we are to be guided by two circumstances, namely, the time, in which any given quantity is to be thrown in, and the effects it has on some parts of the body, as the salivary glands, skin, or intestines. For, mercury may be thrown into the same constitution in very different quantities, so as to produce the same ultimate effect; but, the two very different quantities must also be in different times; for instance, one ounce of mercurial ointment, used in two days, will have more effect upon the constitution, than two ounces used in ten. The effects of one ounce, used in two days, on the constitution and diseased parts, are considerable. A small quantity, used quickly, will have equal effects, to those of a large one employed slowly; but, if these effects are principally local, that is, upon the glands of the mouth, the constitution at large not being equally stimulated, the effect upon the diseased parts must be less, which may be known by the local disease not giving way in proportion to the effects of mercury on some particular part. If it is given in very small quantities, and increased gradually, so as to steal insensibly on the constitution, a vast quantity at a time may at length be used, without any visible effect at all. (*Hunter, p.* 341.)

These circumstances being known, mercury becomes a much more efficacious, manageable, and safe medicine, than it was formerly thought to be; but, unluckily, its visible effects upon the mouth and the intestines are sometimes much more violent, than its general effect upon the constitution at large. These parts must therefore not be stimulated so quickly, as to hinder the necessary quantity of mercury from being used.

The constitution, or parts, are more susceptible of mercury at first, than afterwards. If the mouth is made sore, and allowed to recover, a much greater quantity may be thrown in, a second time, before the same soreness is produced. However, anomalous cases occur, in which, from unknown causes, mercury cannot at one time be made to produce any visible effects; but, afterwards, the mouth and intestines are all at once affected. (*Hunter, p.* 342.)

Mercury occasionally attacks the bowels, and causes violent purging, even of blood. This effect is remedied by intermitting the use of the medicine, and exhibiting opium. At other times, it is suddenly determined to the mouth, and produces inflammation, ulceration, and an excessive flow of saliva. To obtain relief in this circumstance, purgatives, nitre, sulphur, gum-arabic, limewater, camphor, bark, kali sulphuratum, blisters, &c. have been advised. Mr. Pearson, however, does not seem to place much confidence in the efficacy of such means, and, the mercury being discontinued for a time, he recommends the patient to be freely exposed to a dry cold air, with the occasional use of cathartics, Peruvian bark, and mineral acids, and the assiduous application of astringent gargles. "The most material objection, (says Mr. Pearson,) which I foresee against the method of treatment I have recommended, is the hazard, to which the patient will be exposed, of having the saliva suddenly checked, and of suffering some other disease in consequence of it.

"That the hasty suppression of a ptyalism may be followed by serious inconveniences, has been proved by Dr. Silvester, (*Med. Obs. and Inq. Vol.* 3.) who published three cases of persons, who had been under his own care; two of whom were afflicted with violent pains; and the third scarcely retained any food in her stomach for the space of three months. I have seen not only pains, but even general convulsions produced from the same cause. But, this singular kind of metastasis of the mercurial irritation does not appear to me to owe its appearance to simple exposure to cold and dry air; because, I have known it occur in different forms, where patients continued to breathe a warm atmosphere, but used a bath, the water of which was not sufficiently heated. Cold liquids, taken in a large quantity into the stomach, or exposure of the body to cold and moisture, will also prove extremely injurious to those, who are fully under the influence of mercury; whereas breathing a cool air, while the body is properly covered with apparel, has certainly no tendency to produce any distressing, or dangerous consequences.

"If, however, a suppression of the ptyalism should be occasioned by any act of indiscretion, the remedy is easy and certain; it consists only in the quick introduction of mercury into the body, so as to produce a soreness of the gums, with the occasional use of a hot bath." (*Pearson on the Effect of Various Articles in the Cure of Lues Venerea, Edit.* 2, *p.* 163, 164.)

Mercury, when it falls on the mouth, produces, in many constitutions, violent inflammation, which sometimes terminates in mortification. In these habits, great caution is necessary. The ordinary operation of mercury does not permanently injure the constitution; but, occasionally, the impairment is very material; mercury may even produce local diseases, and retard the cure of chancres, buboes, and certain effects of the lues venerea, after the poison has been destroyed. (*Hunter, p.* 342.)

From mercury occasionally acting on the system, as a poison, quite unconnected with its agency as a remedy, and neither proportionate to the inflammation of the mouth, nor the actual quantity of the mineral absorbed, Mr. Pearson noticed that one, or two patients in general died suddenly every year in the Lock Hospital. The morbid state of the system, which tends to the fatal event, during a mercurial course, is named by Mr. Pearson *erethismus*, and is characterized by great depression of strength, a sense of anxiety about the præcordia, irregular action of the heart, frequent sighing, trembling, a small, quick, and sometimes an intermitting pulse, occasional vomiting, a pale contracted countenance, a sense of coldness; but the tongue is seldom furred, and neither the vital, nor natural functions are much disordered. They, who die suddenly of the mercurial erethismus, have frequently been making some little exertion just before. To prevent the dangerous consequences of this state of the system, the use of mercury must be discontinued, whatever may be the stage, extent, or violence of the venereal symptoms. The patient should be directed to expose himself freely to a dry and cool air, in such a manner, as shall be attended with the least fatigue, and he should have a generous diet. In this manner, patients often recover sufficiently in ten, or fourteen days, to resume the use of mercury with safety. In the early stage, the mercurial erethismus may often be averted by leaving off the mercury, and giving the mistura camphorata with large doses of the volatile alkali. When the stomach is unaffected, sarsaparilla sometimes does good. (*Pearson, p.* 154, *&c.*)

Occasionally, the use of mercury brings on a peculiar eruption, which has received the several names of *hydrargyria*, *mercurial rash*, *eczema mercuriale*, *lepra mercurialis*, *mercurial disease*, and *erythema mercuriale*.

"Eruptions of various kinds are very common symptoms of syphilis, but a very unusual effect of mercury. Therefore, until the real nature of this erythema was lately discovered, whenever it occurred in patients undergoing a mercurial course for syphilitic complaints, it was naturally enough considered, as an anomalous form of lues venerea. The mercury was consequently pushed to a greater extent, in proportion to the violence of the symptoms, and, from the cause of the disease being thus unconsciously applied for its removal, it could not fail to be aggravated, and hurried on to a fatal termination. The observation of this fact, conjoined with another, of less frequent occurrence, namely, that a similar eruption did sometimes appear in patients using mercury for other complaints, and in whom no suspicion of syphilis could be entertained, at last led some judicious practitioners in Dublin to the important discovery, that the eruption was entirely an effect of mercury, and not at all connected with the original disease. This discovery was not published till 1804." (*M'Mullin, in Edinburgh Medical and Surgical Journal, No.* 5.) Mr. Pearson states, however, that he has been acquainted with the disease ever since 1781, and has always described its history and treatment in his lectures, since 1783.

The eruption is attended with more or less indisposition, is not confined to either sex, or any particular constitution, and seems to be equally produced by mercury applied externally, and by any of its preparations taken inwardly. Mr. Pearson has never seen it in subjects above 50; and he says, its occurrence is more common about eight, or ten days after beginning a mercurial course. (*P.* 166.)

Dr. M'Mullin distinguishes three distinct stages of the erythema mercuriale. "The first stage commences with languor, lassitude, and cold shiverings; these symptoms are succeeded by increased temperature of the body, quick pulse, nausea, headach, and thirst. The patient is troubled with a dry cough, and complains of difficult respiration, anxiety, and sense of stricture about the præcordia. The tongue is usually moist, and covered with a white glutinous slime; it sometimes appears clean, and brightly red in the centre, whilst the margins remain foul. The skin feels unusually hot and itchy, with a sense of prickling, not unlike the sensation experienced from the application of nettles. The belly is generally costive; but, a diarrhœa is often produced by very slight causes.

"On the first, or second day, an eruption most commonly shews itself, the colour of which is either dark or bright red: the papulæ are at first distinct and elevated, resembling very much those in rubeola. Sometimes, but rarely, the eruption appears like urticaria, and in such instances the disease is observed to be very mild. The papulæ very speedily run together in such a manner as to form a suffused redness, which disappears on

pressure. In most cases it begins first on the scrotum, inside of the thighs, forearm, or where mercurial friction had been applied, and the integuments of the parts affected become much swoln. There have also been observed instances, where an eruption of a purplish colour, and unaccompanied by papulæ, has diffused itself suddenly over the entire body. This, however, may be considered as uncommon. In every instance which came under my observation, it was confined at first to a few places, and from thence gradually extended, until the different portions of the eruption had united, and the papulæ were also rough to the feel. But in those cases, which resemble urticaria, a number of minute vesicles, which contain a serous fluid, appear, from the commencement, interspersed among the papulæ. Contrary to what happens in most diseases accompanied with cutaneous affections, the febrile symptoms are much aggravated, and continue to increase after the eruption has been completed. The pulse in general beats from 120 to 130 in a minute, the thirst continues urgent, and the patient, extremely restless, seldom enjoys quiet sleep. When the eruption has continued in this manner for a certain period, the cuticle begins to peel off in thin, whitish, scurfy exfoliations, not unlike those observed in rubeola. This desquamation has not been attended to by Dr. Moriarty or Mr. Alley, if they have not, by giving the same name to the decrustation which occurs in the last stage, confounded both together. It commences in those places where the eruption first made its appearance, and in this order spreads to other parts. About this period the fauces become sore, the tongue swells, and the eyes appear somewhat inflamed.

"The duration of this stage is very various; sometimes it continues from ten to fourteen days, and in other cases it terminates in half that time. When the disease has appeared in its mildest form, the patient recovers immediately after this desquamation, a new cuticle having formed underneath; but, if severe, he has only experienced the smallest part of his sufferings, and the skin now assumes a new appearance, which I have considered as the second stage.

"The skin at this period appears as if studded with innumerable minute vesicles, which are filled with a pellucid fluid. These vesicles may be expected, if the patient, at the close of the first stage, complains of increased itching, and sense of burning heat, in those parts from which the cuticular exfoliations have fallen. They remain sometimes for a day or two, but are most commonly burst, immediately after their formation, by the patient rubbing them, in order to relieve the troublesome itchiness with which these parts are affected. They discharge a serous, acrimonious fluid, which possesses such a very disagreeable odour as to induce nausea in the patient himself, and those who approach near his bed-side. The odour is so peculiar, that it can easily be recognised by any person who has once experienced it.

"This fluid is poured out most copiously from the scrotum, groin, inside of the thighs, or wherever the skin forms folds, and sebaceous glands are most numerous. The serous discharge from these minute vesicles form, with the cuticle, an incrustation, which may be considered as the third or last stage.

"These crusts are generally very large, and, when detached, retain the figure of the parts from which they have fallen. Their colour is yellowish; but sometimes appears dark and dirty. This period of the disease might be termed, I think, with much propriety, the stage of *decrustation*, in order to distinguish it more fully from the *desquamation*, which has been already noticed. From the use of the two last terms indiscriminately, those who have described the disease, have introduced into their descriptions a degree of confusion, which has caused its progress not to be well understood. When this stage appears, the fauces become more affected, the eyes intolerant of light, and the tarsi tender, inflamed, and sometimes inverted. The crusts formed on the face, as in other parts of the body, before falling off, divide asunder, so as to leave cracks and fissures, which produce an hideous expression of countenance; and the eyelids are also, from the general swelling of the face, completely closed. The back and hairy scalp are last affected, and, even in very severe cases, these parts are sometimes observed to escape entirely. The patient, whilst in this state, is compelled to desist from every kind of motion, on account of the pain which he experiences on the slightest exertion, and which he describes as if his flesh were cracking. The crusts also fall off in such abundance, that the bed appears as if strewed with the cones of hops. Whilst the eruption is only making its appearance in one place, another part may have arrived at its most advanced form; so that all the different stages of the disease may be present at one time in the same individual. It is attended with typhus through its entire course; but it is very curious to observe, that the appetite for food, in most cases, remains unimpaired, and sometimes is even voracious. This circumstance was particularly remarkable in a patient who laboured under the disease, in its worst form, for the space of three months,

in the Royal Infirmary of Edinburgh; for double the usual hospital allowance of food was scarcely sufficient to satisfy his hunger. When the catarrhal symptoms have continued during the progress of the complaint, they are, at this advanced period, particularly aggravated: the anxiety and pain of the breast are also very severe, attended with cough, and bloody expectoration, and the patient always feels languid and dejected. The pulse becomes frequent, feeble, and irregular, the tongue black and parched, and at length diarrhœa, delirium, convulsions, gangrene of the surface of the body, and death, supervene. In its mild form, it only goes through the first stage, and terminates, as we have already stated, in a few days, by a slight desquamation. But, when severe, it is often protracted more than two months, every stage of the eruption continuing proportionably longer; and when, in this manner, it has run its course, it repeatedly breaks out on the new surface, and passes through the same stages." (*M'Mullin in Edinb. Med. and Surg. Journal, No. 5.*)

With respect to the remote cause, this is the employment of mercury. Dr. M'Mullin is inclined to think with Dr. Gregory, that the application of cold to the body, while under the action of mercury, is absolutely necessary, for its production; an opinion strengthened by there always existing catarrhal symptoms. Mr. Pearson, however, thinks cold has no concern in bringing on the complaint.

In the early stage, Mr. Pearson recommends small doses of antimonial powder, with saline draughts, or the ammonia acetata. A gentle purgative should be given every three, or four days, and opium to procure sleep. The latter medicine sometimes does most good, when joined with camphor, or Hoffman's anodyne liquor. Sarsaparilla and bark may be given, when the discharge is no longer ichorous, and the tumefaction has subsided. Vitriolic acid has seemed to give relief. The diet may be light and nutritive, without fermented liquors, however, till the desquamation has somewhat advanced. Frequent use of the warm bath, and often changing the patient's linen and sheets, which soon become stiff and rough with the discharge, afford much benefit. If the warm bath cannot be had, Mr. Pearson advises washing the body very tenderly with warm water-gruel; he also covers parts, from which the cuticle is detached, with a mild cerate, and renews the application twice a day. (*P.* 178.)

Dr. M'Mullin advises the immediate discontinuance of mercury; the removal of the patient from wards, where this mineral is in use; emetics and diaphoretics; but on account of the very irritable state of the bowels, he says antimonials are hardly admissible, and that when purgatives are indicated, only the mildest ones, such as ol. ricini, magnesia vitriolata, &c. ought to be given. He advises mucilaginous draughts with opium for relieving the soreness of the fauces. In the second stage, the cold infusion of bark with aromatics and opium, or, what are more praised, wine, porter, &c. To relieve the ophthalmia tarsi, the unguentum oxidi zinci, and to appease the painful sensation of the skin cracking, the linimentum calcis, which should be liberally applied as soon as crusts appear. See more particulars in Dr. M'Mullin's Essay.

Consult *Essay on a Peculiar Eruptive Disease, arising from the Exhibition of Mercury, by G. Alley, Dublin*, 1804. *A Description of the Mercurial Lepra, by Dr. Moriarty, Dublin*, 1804. *Spens and M'Mullin, in Edinburgh Med. and Surgical Journal, No. 1, and 5. Pearson on Lues Venerea, Edit. 2.*

REMARKS ON THE PARTICULAR MODES OF GIVING MERCURY, AND ON ITS PREPARATIONS.

Frictions with Mercurial Ointment.

No metal acts in its pure metallic state; it must first be more or less combined with oxygen. The mercury, contained in the unguentum hydrargyri, becomes in a certain degree oxydated, when triturated for the purpose of blending it with the fat. The metal, however, in mercurial ointment, is in the most simple, and least combined form, of all its preparations, and hence, it not only generally operates with more mildness on the system, but, with more specific effect on the disease. Various salts of mercury, when given internally, operate more quickly, than mercurial frictions; but, few practitioners of the present day confide solely in any internal preparations for curing the venereal disease, particularly, when the virus has produced effects in consequence of absorption. We shall only just mention in this part of the work, that rubbing in mercurial ointment is the mode of affecting the system with mercury, which is generally considered to agree best with most constitutions, and to act with most certainty on the venereal disease.

Mercurial Fumigations.

We have mentioned this method, as being one of the most ancient plans of affecting the constitution with mercury, and Lalonette and Abernethy have stated cir-

cumstances in its favour, which certainly render it sometimes a very eligible mode. The latter is of opinion, that if the peculiar advantages of mercurial fumigations were generally known to practitioners, they would be much more frequently employed. The advantages of the method consist in its affecting the constitution, when other means have failed, and in producing its effects in a much shorter time, than any other mode requires. How desirable this celerity of operation must often be, when venereal ulceration is making great ravages in the palate, throat, &c. it is needless to insist upon. In patients, who have not strength to rub in ointment, and whose bowels will not bear the internal exhibition of mercury, the mode of fumigation may prove of great service.

"In the year 1776, the Chevalier Lalonette, a physician at Paris, laid before the public an account of a new mode of mercurial fumigation, free from the inconveniences of former ones, and which, in the space of thirty-five years, he had successfully employed in more than four hundred cases, that had resisted all the ordinary methods of cure. His method consisted in inclosing the patient, previously undressed, in a kind of box resembling a sedan-chair, with an opening at the top to let out the head, and another at the bottom, to which was fitted a small grate or furnace, having in it a heated iron for converting the mercurial remedy into fume. The preparation he made use of was a kind of calomel, which, by repeated sublimation from iron-filings, was so far deprived of its muriatic acid, as to be in part reduced into running quicksilver; and, while it possessed considerable volatility, was perfectly irritating. Some of this powder, being strewed upon the hot iron placed below, was immediately converted into smoke, which surrounded the patient's body, and after some time settled on his skin in the form of a white and very fine calx of quicksilver: a complete dress, having its inner surface fumigated with the same powder, was then put on.—The remedy being thus generally applied to the mouths of the cutaneous absorbents, soon got admission into the circulating fluids, and the constitution became thereby more speedily affected, than by any other process known before." (*Abernethy's Surgical and Physiological Essays, Part* 3.)

As the fumigating powder used by M. Lalonette was very operose, and consequently a very expensive preparation, and appeared to have no advantages over one made by abstracting the muriatic acid from calomel by means of volatile alkali, Mr. A. has always employed the latter, which is prepared at the hospital in the following manner: Two drachms of aqua ammoniæ are added to six ounces of distilled water, and four ounces of calomel are thrown into this liquor, and shaken up with it; the powder is afterwards separated by a filter, and dried.

The powder thus obtained is of a grey colour, and contains a good deal of quicksilver in its metallic state, which of course is extremely volatile, but becomes oxydated when raised into fume, and afterwards condensed into a white subtile powder.

Mr. A. never knew this method fail in curing the lues venerea.

In local disease of the joints, such, for instance, as frequently takes place in the knee, and in sarcomatous enlargements of the breast in women, Mr. Sharp, and Sir C. Blicke have long been accustomed to direct fumigated stockings, or underwaistcoats, to be worn; by which the complaints have been relieved, and the constitutions of the patients affected, without the trouble and unpleasantness arising from the use of the common mercurial ointment. (See *Abernethy's Surgical and Physiological Essays, Part* 3.)

Mr. Pearson procured Lalonette's machine, and made a considerable number of experiments to determine the comparative advantages of this method, and mercurial frictions. He found, that the gums became turgid and tender very quickly, and that the local appearances were sooner removed, than by the other modes of introducing mercury into the system; but that it soon brought on debility, a rapid and premature salivation, and, of course, the medicine could not be steadily continued. This gentleman concludes, that where checking the progress of the disease suddenly is an object of great moment, where the body is covered with venereal ulcers, or where the eruptions are large and numerous, so that there scarcely remains a surface large enough to absorb the ointment, the vapour of mercury will be advantageous. But, he thinks it extremely difficult thus to introduce a sufficient quantity of mercury into the system to secure the patient from a relapse, and therefore by no means eligible as a general practice. The vapour of mercury, he says, is singularly efficacious, when applied to venereal ulcers, fungi, and excrescences; but this plan requires an equal quantity of mercury to be given in other ways, as if the local application itself were not a mercurial one. (*Pearson on Lues Venerea, p.* 145, *&c.*)

For the purpose of fumigating sores, the hydrargyrus sulphuratus ruber is commonly used. Ulcers and excrescences about the pudendum and anus in women are said to be particularly benefited in this way; and in these cases the fumes are

most conveniently applied by placing a red-hot heater at the bottom of a night-stool pan, and after sprinkling on it a few grains of the red sulphurated quicksilver, placing the patient on the stool. On other occasions, a small apparatus, sold at the shops, is used, which enables the surgeon to direct the fumes through a funnel against the ulcer in any situation.

Though mention has just been made of *venereal* excrescences, I am of opinion with Mr. Abernethy, that it is very questionable, whether any are ever really of this nature. I know, that many excrescences and verrucæ about the anus, and parts of generation, diminish and are cured by a course of mercury. This is the only argument in favour of their being venereal; for, when tied, cut off, or made to fall off by stimulating them with pulv. sabinæ and ærugo æris, they are as effectually cured, as if mercury had been given.

PREPARATIONS OF MERCURY FOR INTERNAL EXHIBITION.

The acetite of mercury is supposed to be a mild preparation, and was the active ingredient in the celebrated Keyser's pills. In solution it has also been recommended to be applied externally for the removal of some cutaneous affections. It may be made into pills with crumb of bread. The dose is from one to five grains every night.

When you wish to excite a salivation quickly, when mercurial ointment alone will not produce this effect, or cannot be employed, and when fumigating is not convenient nor agreeable, the hydrargyrus calcinatus is often prescribed. The common dose is a grain, which may be increased to two, a day. It is apt, however, to disagree with the stomachs and bowels of many patients; but, some can still continue to take it when conjoined with opium.

The hydrargyrus cum creta has occasionally been prescribed. The dose is ten grains; but it is a preparation, at present, not in much repute.

The hydrargyrus muriatus (corrosive sublimate) was a medicine highly praised for its antisyphilitic virtues by the celebrated Van Swieten, and, indeed, there is no doubt, that, like other preparations of mercury, it possesses such qualities. It retains great reputation even now, and, probably, will always do so. However, like the hydrargyrus calcinatus, it sometimes deranges the stomach and bowels, and is never deserving of such confidence as mercurial frictions. Mr. Pearson remarks, that "when the sublimate is given to cure the primary symptoms of syphilis, it will sometimes succeed; more especially when it produces a considerable degree of soreness of the gums, and the common specific effects of mercury in the animal system. But it will often fail of removing even a recent chancre; and where that symptom has vanished during the administration of corrosive sublimate, I have known a three months course of that medicine fail of securing the patient from a constitutional affection. The result of my observations is, that simple mercury, calomel or calcined mercury, are preparations more to be confided in, for the cure of primary symptoms, than corrosive sublimate. The latter will often check the progress of secondary symptoms very conveniently; and I think it is peculiarly efficacious in relieving venereal pains, in healing ulcers of the throat, and in promoting the desquamation of eruptions. Yet, even in these cases, it never confers permanent benefit; for, new symptoms will appear during the use of it; and, on many occasions, it will fail of affording the least advantage to the patient, from first to last. I do sometimes, indeed, employ this preparation in venereal cases; but it is either at the beginning of a mercurial course, to bring the constitution under the influence of mercury at an early period, or during a course of inunction, with the intention of increasing the action of simple mercury. I sometimes, also, prescribe it after the conclusion of a course of frictions, to support the mercurial influence in the habit, in order to guard against the danger of a relapse. But, on no occasion whatever, do I think it safe to confide in this preparation singly and uncombined, for the cure of any truly venereal symptom." (*Pearson on Lues Venerea.*)

The dose of hydrargyrus muriatus is a quarter of a grain.

The following is a common mode of ordering it: ℞. Hydrargyri Muriati gr. i. Aquæ Nucis Moschatæ ʒij. Misce. ʒss. Omni nocte sumenda.

The hydrargyrus muriatus mitis (calomel) is not much used by modern surgeons for the cure of the venereal disease. Sometimes, indeed, it is given in cases of gonorrhœa, with a view of preventing venereal symptoms from following. But, it is extensively given as an alterative, and for the cure of such surgical diseases as require the system to be slightly under the influence of mercury. It generally proves actively purgative, when more than two or three grains are given.

The hydrargyrus phosphoratus has been successfully prescribed in the following formula: ℞. Hydargyri phosphorati gr. iv. Corticis Cinnamomi in pulverem triti gr. xiv. Sacchari Purif. ʒss. Misce.

The whole is to be divided into eight equal parts, one of which is to be taken

every morning and evening, unless salivation takes place, when it ought to be discontinued. Some patients, however, will bear from one to two grains of the phosphat of quicksilver, without inconvenience.

"This remedy has been observed to heal inveterate venereal ulcers in a very short time, nay, in the course of a few days, particularly those about the pudenda. In venereal inflammations of the eyes, chancres, rheumatisms, and chronic eruptions, it has proved of eminent service. Upon the whole, if used with the necessary precaution, and in the hands of a judicious practitioner, it is a medicine mild and gentle in its operation. The cases, in which it deserves the preference over other mercurial preparations, are these: in an inveterate stage of syphilis, particularly in persons of torpid insensible fibres—in cases of exostosis as well as obstructions in the lymphatic system—in chronic complaints of the skin, &c." (*Journ. de Gotha.*)

In the Pharmacopœia Chirurgica may be seen an account of the manner of making the hydrargyrus phosphoratus, taken from the Journal of Inventions of Gotha, No. 2. As the author of the first work suggests, opium would certainly be most likely to correct the bad effects of the preparation on the stomach and bowels.

It is generally admitted by surgeons, that the most simple preparations of mercury are the most effectual in eradicating the venereal disease. The pilulæ hydrargyri are the most simple of the internal formulæ, being merely mercury triturated with mucilaginous or saccharine substances. Next to mercurial frictions, they are, perhaps, most frequently employed for the cure of the incipient form of the venereal disease, that is, while a chancre is the only complaint. They are also very commonly given in all stages of the disease, to aid mercurial frictions in bringing the system under the influence of the specific remedy. Ten grains of the mass, kept for these pills, is the usual dose. When they purge, opium will sometimes prevent this effect.

We must reserve other observations on the use of mercury in syphilis for the article *Venereal Disease.*

Mercury is employed both constitutionally and locally in numerous surgical cases; for the removal of indolent thickenings and indurations of parts; for the relief of tinea capitis, herpetic diseases, tetanus, hydrophobia, hydrops articuli, and a multitude of other affections, which we need not here specify.

MEROCELE. (from μηρος, the thigh, and κηλη, a tumour.) A femoral or crural hernia. See *Hernia.*

METACINEMA. (from μετα, after, and κινεω, to remove.) A removal of the pupil of the eye from its natural situation.

METASTASIS. (from μεθιστημι, to transfer.) A transposition of a disease from one part to another.

MEZEREON. (said, by Blanchard, to be derived from some barbarous dialect.) This medicine was recommended by Dr. A. Russell for a particular class of venereal symptoms, in the following terms: "The disease, for which I principally recommend the decoction of the mezereon root as a cure, is the venereal node that proceeds from a thickening of the membrane of the bones. In a thickening of the periosteum, from other causes, I have seen very good effects from it: and it is frequently of service in the removal of those nocturnal pains, with which venereal patients are afflicted; though, in this last case, excepting with regard to the pain that is occasioned by the node, I own I have not found its effects so certain, as I at first thought I had reason to believe. I do not find it of service in the cure of any other symptom of the venereal disease." (*Med. Obs. and Inq. vol.* 3, *p.* 194, 195.) Mr. Pearson, however, asserts, unequivocally, that mezereon has not the power of curing the venereal disease in any one stage, or under any one form, and if the decoction should ever reduce a venereal node, yet there will be a necessity for taking mercury in as large quantity, and for as long a time, as if no mezereon had been exhibited. Cullen found this medicine of use in some cutaneous affections, but, excepting an instance or two of lepra, Mr. Pearson has very seldom found it possessed of medicinal virtue, either in syphilis, or the sequelæ of that disease, scrofula, or cutaneous affections. (*Pearson on Lues Venerea, p.* 55—59.)

MIASMA. (from μιαινω, to pollute.) The matter, or effluvia producing contagion.

MODIOLUS. (dim. of *modius,* a measure.) The crown, or saw of a trepan, so called, because it was formerly contrived to enter only to a certain depth.

MOLLITIES OSSIUM. A morbid softness of the bones, which become preternaturally flexible, in consequence either of the inordinate absorption of the phosphate of lime, from which their natural solidity is derived, or else of this matter not being duly secreted and deposited in their fabric. In rickets, the bones only yield and become distorted by slow degrees, and retain their natural inflexibility; but, in the present disease, they may be at once bent in any direction. The mollities ossium is rare, and its cause not understood. To give an idea of the disorder, I shall quote the case of

Madame Supiot. In the year 1747 she had a fall, which occasioned her to keep her bed for some time, and left great pain and weakness in her loins, and lower extremities. In about a year and a half afterwards, she began to perceive her left leg particularly affected. Along with this weakness, she had violent pains over her whole body, which increased after a miscarriage, and still more after a natural delivery, in the year 1751. She was now seized with startings, great inquietude, and such violent heats, that she was almost continually in a sweat, and could not bear the least covering even in the coldest weather, and while her pains continually increased, she took notice that her urine precipitated a white sediment. Her pains abated on the appearance of the sediment, but she now observed that her limbs began to bend, and from this time the softness of them gradually increased till her death. In the month of April 1752, the trunk of the body did not exceed 23 inches in length; the thorax exceedingly ill formed, and the bones of the upper part very much distorted; those of the lower part were very much bent, and the thigh-bones became so pliable, that her feet might easily be laid on each side of her head. The right side did not, till after some time, become so deformed as the left; but it was surprising to observe the alterations which daily took place, and the different figures assumed by the limbs, in consequence of the increased softness of the bones; so that when the sediment in the urine was considerable, the disease of the bones seemed to be at a stand, increasing considerably when it was suppressed. Besides this, she had violent pains, startings, difficulty of breathing, spitting of blood, and, lastly, a fever, with convulsions. She died in the beginning of November 1752, and, on dissecting her body, the following appearances were observed: 1. The muscles in general were of a very soft and pale consistence, the vastus externus, fascialis, quadriceps, biceps, and external parts of the gracilis, were much shorter than in their natural state, and more firm and tense; while those on the opposite side were much elongated, thin, and very tender; in short, the whole muscular system had suffered more or less, according to the action of the muscles in her life time. 2. The bones were entirely dissolved, the periosteum remaining unhurt, so that they exhibited only the form of a cylinder. 3. The heart and large blood-vessels, both veins and arteries, contained large black polypi, of a viscid consistence, and very unlike those usually found in dead bodies.

A case of softness of the bones is related by Mr. Gooch, but considerably different from the above, as it was attended with a remarkable fragility of the bones before they became soft. It likewise began with pains through the whole body, attended with feverish symptoms; but, after some weeks, they became confined chiefly to the legs and thighs, though they were not increased by pressure. This fragility of the bones does not appear to have been the case with Madame Supiot. In the month of June, 1743, Mr. Gooch's patient broke her leg, in walking from her bed to a chair, and heard the bone snap. No callus, however, formed, though the fracture was instantly reduced, and treated by one of the best surgeons in that part of the country; but, instead of this, the bones began to grow flexible, and, in a few months, were so from the knee to the ankle. The disease still continued to increase, so that, in a short time, the other leg and thigh were affected in the same manner, after which both legs and thighs became œdematous, liable to excoriations, and to discharge a thin yellow ichor. Scorbutic symptoms began to appear in the winter after her leg was broken, and her gums began to bleed. Tonic medicines were exhibited without any success, only that her menstruation became more regular, and her appetite and digestion better than before; but, towards the end of her life, her breathing became difficult, the spine distorted, and a pain in the loins took place upon every motion of the vertebræ; and, as her limbs were now quite useless, she was obliged to sit upright in bed. At last, the ends of the bones, on which she sat, having become also very soft, spread much, and the ends of her fingers and thumbs, by frequent endeavours to raise herself, became also very broad, and the phalanges crooked. The flexibility of the bones gradually increased, and became more general, attended with a wasting of the flesh, and excessive difficulty of breathing. The menstrual flux totally ceased four months before her death; her legs, which were very anasarcous, and excoriated almost all over, became erysipelatous, but she retained her senses to the last. She expired suddenly, having talked in a composed manner concerning her miserable situation and approaching end only a few moments before.

On examining the body, she was found to have lost two feet two inches of her natural stature. The heart and lungs appeared sound, but had been much confined, principally by the liver, which was enlarged to an extraordinary degree; it was not, however, scirrhous, nor in any other way diseased. The spleen was very small, and the mesentery had one large scirrhous gland. All the bones, except the teeth, were softened, so that scarcely any

of them could resist the knife; but those of the lower extremities were the most dissolved, being changed into a kind of parenchymous substance, like soft dark-coloured liver, without any offensive smell. So completely, indeed, were they decomposed, that the knife met with less resistance in cutting through them, than in sound muscular flesh, though some bony lamellæ were here and there to be met with, but as thin as an egg-shell. The most compact bones, and those which contained the greatest quantity of marrow, were the most dissolved; and it was observable, that the dissolution began internally, for the bony laminæ remained here and there on the outside, and nowhere else. The periosteum was rather thicker, than ordinary, and the cartilages thinner; but, not in a state of dissolution. The bones were found to contain a great quantity of oily matter and little earth. No cause could be assigned for the disease; and in the case of Madame Supiot, the one assigned, viz. that of her eating too much salt, seems totally inadequate to explain the origin of the disorder. All the cases of the mollities ossium on record have proved fatal, and no means of cure are yet known.—*Morand in Mem. de l'Acad. des Sciences*, 1752. *See also Chirurgical Observations and Cases, by William Bromfield, Vol.* 2, *p.* 30, *&c. We meet with cases of this nature in the Philosophical Transactions; Act. Hafniens.; German Ephem.*; *Saviard's Obs. Chir.*; *the writings of Forestus*; *Gooche's Chirurgical Works, Vol.* 2, *p.* 393—399. *Edit.* 1792; *&c.*

MONOCULUS. (from μονος, single, and *oculus*, the eye.) A bandage formerly applied to the fistula lachrymalis, and diseases of the eye. It consists of a single-headed roller three ells long. To apply it to the right eye, it is to be held in the right hand, and its end in the left, *et vice versâ*. This end is to be put on the back of the neck, and one turn of the roller is to be carried round, over the forehead, so as to meet the extremity of the bandage. The roller is then to descend under the ear of the side affected, and to pass obliquely over the cheek underneath the eye, and next over the root of the nose, and opposite the parietal bone, to the nape of the neck. The third turn of the roller is to overlap the second a little; the third the fourth; making what the French call *doloires*; and the application of the bandage is completed by making turns round the head. The use of the monoculus was only to retain dressings. (*Encyclopédie Méthodique; Partie Chirurgicale.*)

MORTIFICATION. (*mortificatio*, from *mors*, death, and *fio*, to become.) The death of a part of the body.

Mortification is of two kinds, the one without inflammation, the other preceded by it. Inflammation is an increased action of that power, which a part naturally possesses; and in healthy inflammations, at least, it is probably attended with an increase of power. In cases, however, which are to terminate in mortification, there is no increase of power; but, on the contrary, a diminution of it. This, when joined to an increased action, becomes a cause of mortification, by destroying the balance, which ought to subsist between the power and action of every part. There are, besides, cases of mortification, preceded by inflammation, which do not arise wholly from that, as a cause: of this kind, are the carbuncle and the slough formed in the small-pox pustule. (*Hunter.*) When any part of the body loses all motion, sensibility, and natural heat, and becomes of a brown, livid, or black colour, it is said to be affected with *sphacelus*, that is, complete mortification. As long as any sensibility, motion, and warmth, continue, the state of the disorder is termed, *gangrene*. This word is here made use of to signify only a degree of sphacelus, or rather the process, by which any local disorder falls into the state of complete mortification. Many authors use both terms synonymously but, it is to be observed, that gangrene does not invariably end in sphacelus; nor is the latter always preceded by the former. (*Richter's Anfangsgr. der Wundarzneykunst. Band* 1. *Kap.* 3.) There are some surgical writers, however, who make the distinguishing circumstance of sphacelus to be the extension of the disorder to the bones as well as the soft parts. (*Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 30, *Edit.* 1809.)

The causes of mortification are either internal, or external. It is commonly taught in the medical schools on the continent, that the internal causes probably operate after the manner of a deleterious substance, which being introduced into the circulation, occasions a putrefaction of the fluids. (*Lassus, op. et loc. cit.*)—This doctrine, however, is supported by no sort of proof, and may be considered as entirely hypothetical, if not decidedly erroneous.

There are, indeed, as the preceding author has noticed, some spontaneous mortifications, the primitive cause of which is not always well understood: an inflammation, apparently slight, may become gangrenous immediately it has made its appearance. In scorbutic, venereal, and small pox cases, we have daily instances of this fact. Other internal causes sometimes cut off, without any very evident pre-existing disease, persons, who are but little advanced in years. (*Saviard, Obs.* 16. *Haller, Disput. Chirurg.*

Tom. 4, *p.* 551.) Certain poisonous, acrid, caustic substances taken inwardly, or introduced under the skin, may have the same effect, by annihilating the vital action, or destroying the texture of parts. (*Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 31.) But, though these observations may all be entirely correct, they by no means justify the conclusion, that the internal causes of mortification ever act like a deleterious matter producing a putrefaction of the fluids. The mortification of the toes and feet, so well described by Mr. Pott, proceeds from internal causes, which have not hitherto admitted of any accurate explanation.

Another very remarkable specimen of mortification from an internal cause, is that originating from eating bread made of bad black wheat, or rye. It is curious, that this case, both in man and other animals, always begins upon the extremities of the limbs. (*Mém. de l'Acad. des Sciences, ann.* 1710, *p.* 61.)

The external causes of mortification, which are manifest, and act mechanically, are burns; excessive cold; the application of caustics; the presence of any ichorous, urinary, or fecal matter effused in the cellular substance; violent contusions, such as are produced by gunshot wounds, or bad fractures; the strangulation of a part, as in cases of hernia, or when polypi, or other tumours are tied; a high degree of inflammation; and, lastly, every thing, that has the power of stopping the circulation and nervous energy in parts. (*Lassus, Pathologie Chirurgicale, Tom.* 1. *p.* 34, 35.)

Inflammation is one of the most frequent occasional causes of mortification. But, as we have already remarked, the death of a part may take place without any previous inflammatory disorder; and the latter, even when present, has frequently less share in the mischief, than other incidental circumstances, and is, in reality, only an effect of the very same cause, which produces the sphacelus itself. It is oftentimes a matter of doubt, whether actual inflammation precedes the occurrence, or not; for, a part, before it mortifies, is often only affected with pain, and with no degree of preternatural redness. Lastly, when mortification is, unquestionably, preceded by inflammation, there are so many varieties of the disorder, depending on incidental causes, that these latter demand more attention, than the inflammation itself. (*Richter's Anfangsgr. Band* 1, *Kap.* 3.)

Healthy phlegmonous inflammation seldom ends in mortification, though it occasionally does so, when very extensive and vehement.

Of all the inflammatory complaints, to which the system is liable, erysipelas is observed most frequently to terminate in gangrene, and whenever phlegmon is, in any degree, conjoined with an erysipelatous affection, which it not unfrequently is, it seems thereby to acquire the same tendency, being more difficult to bring to resolution, or suppuration, than the true phlegmon, and more apt to run into a mortified state. (*B. Bell.*)

The symptoms of mortification from inflammation take place variously, yet, generally, as follows. The pain and sympathetic fever suddenly diminish, the part affected becomes soft, and of a livid colour, losing, at the same time, more or less, of its natural warmth and sensibility. In some places, the cuticle is detached; while, in other situations, vesicles arise, filled with a clear, or turbid fluid. Such is the state, to which we apply the term, *gangrene*, and, which stage of the disorder too often rapidly advances to *sphacelus*, when the part becomes a cold black, fibrous, senseless substance, called in technical language a *slough*.

The causes which produce mortification by impeding the return of blood from the part affected, for the most part operate by making pressure on the trunk, or principal branches, of a vein. In these instances, there is always an accumulation of blood in the part, which first swells, becomes of a livid colour, tense, and very painful. Soon afterwards, blisters arise, and the part becomes soft, œdematous, cold, insensible, emphysematous, black, and fetid. Such are the circumstances, which happen in strangulated herniæ, in tied polypi, and in a limb, in which the veins have been so compressed by any hard swelling, such as the head of a dislocated bone, as to excite mortification.

Other causes operate by preventing the entrance of arterial blood. The application of a ligature to an artery, as practised in several surgical cases, and all external pressure, that closes the artery, or arteries, on which a part entirely depends for its supply of blood, have this effect. Mortification does not, however, always take place, when the trunk of an artery is rendered impervious, because nature furnishes the necessary supply of blood, through collateral ramifications. But, when the disorder does happen, the part commonly first becomes pale, flaccid, and cold, and soon afterwards shrinks, loses its sensibility, grows black, and perishes.

It is usually represented by writers, that mortification may proceed from a mere lessening of the communication of blood and nervous energy to a part. However, it is to be observed, that parts, deprived of all connexion with the sensorium, by the division, or paralytic state,

of their nerves, do not frequently perish on this account. But, as their functions are carried on with less vigour, and their vitality is weakened, the same causes, which sometimes produce mortification in parts differently circumstanced, must much more readily occasion it in these. Among the causes of the present species of mortification, may be mentioned great universal debility; extreme old age; a thickening and ossification of the coats of the arteries, and a consequent diminution of their capacity, and of their muscular and elastic power.

The mortification, arising from long continuance in the same posture, is chiefly attributable to the unremitted pressure, which parts sustain, and which obstructs the circulation. Surgeons have frequent occasion to see melancholy examples of this kind of mortification, particularly, in cases of fractures, paralysis from disease of the vertebræ, &c. The mischief most readily occurs, where the bones have the least flesh upon them, and, consequently, where all external pressure has the most effect; as, for instance, about the os sacrum, os ilium, spines of the scapulæ, &c. The disordered part always first becomes soft, livid, red at the circumference, and, œdematous, afterwards losing its sensibility, and acquiring a black appearance: at length, it is converted into a foul sloughing ulcer.

Though long continuance in the same posture is the grand cause of this kind of mortification; yet, incidental circumstances are frequently combined with it, and have great influence over the disorder. These are, great debility, the same state of the system, as exists in typhus fever, impure air, unclean bedding, &c.

There are some causes, which produce death in a part at once, by the violence of their operation. A blow, struck very forcibly, on any portion of the body, may destroy the vitality of the fibres and vessels in this sudden manner. When a ball enters the substance of parts with great force and rapidity, it always kills at once many of the fibres, which are in the way of its track, and these must be thrown off in the form of sloughs, before the wound can granulate and heal.

Cold is often another cause of mortification, and, when parts, which have been frozen, or frostbitten, are suddenly warmed, they are particularly apt to slough.

I find in M. Larrey's late valuable publication, some interesting observations on the gangrene from cold. He acquaints, that after the battle of Eylau, one of the most grievous events, to which the French soldiers were exposed, was the freezing of their feet, toes, noses, and ears: few of the vanguard escaped the affliction. In some, the mortification was confined to the surface of the integuments of the toes, or heels; in some, the skin mortified more deeply, and to a greater or lesser extent; while, in others, the whole of the toes, or foot, was destroyed.

"All the writers on this species of mortification (says M. Larrey) have considered cold as the determining cause; but, if we attend to the period when the complaint begins its progress, and the phenomena, which accompany it, we shall be convinced, that cold is merely the predisposing cause. In fact, during the three or four exceedingly cold days, which preceded the battle of Eylau, (the mercury having then fallen to 10, 11, 12, 13, 14, and 15 degrees below zero of Reaumur's thermometer) and until the second day after the battle, not a soldier had complained of any symptom depending upon the freezing of parts. Nevertheless, we had passed these days, and a great portion of the nights of the 5, 6, 7, 8, and 9th, of Feb. in the snow, and the most severe frost. The imperial guard especially, had remained upon watch in the snow, hardly moving at all for more than four and twenty hours, yet, no soldier presented himself at the ambulance,* nor did any one complain of having the feet frozen. In the night of the 9th and 10th of February, the temperature suddenly rose, the mercury ascending to 3, 4, and 5 degrees above zero. A great quantity of sleet, that fell on the morning of the 10th, was the forerunner of the thaw, which took place in the course of that day, and continued in the same degree for several days. From this moment, many soldiers of the guards and the line applied for succour, complaining of acute pain in the feet, and of numbness, heaviness, and prickings in the extremities. The parts were scarcely swollen, and of an obscure red colour. In some cases, a slight redness was perceptible about the base of the toes, and on

* The ambulances of the French army are caravans, furnished with an adequate number of surgeons, and every requisite for the dressing of wounds, and the immediate performance of operations, upon which last circumstance, in particular, the life of the wounded soldier often depends. These caravans follow the most rapid movements of the army, and are always capable of keeping up with the vanguard. It is to be regretted, that no surgeon-general of our army has organized any thing of this sort: it is the only means, however, by which speedy surgical assistance can be rendered to the thousands of wounded in every considerable action.

the back of the foot. In others, the toes were destitute of motion, sensibility, and warmth, being already black, and, as it were, dried. All the patients assured me, that they had not experienced any painful sensation during the severe cold, to which they had been exposed on the night watches of the 5, 6, 7, 8, and 9th of February, and that it was not till the night of the 10th, when the temperature had risen from 18 to 20 degrees, that they felt the first effects of the cold." It is further noticed by M. Larrey, that such patients as had had opportunities of warming themselves in the town, or at the fires of the night-watches, suffered in the greatest degree. (See *Larrey's Mémoires de Chirurgie Militaire, Tom.* 3, *p.* 60—62.)

Sometimes mortification seems to depend on epidemic causes. Instances have been known, in which almost all the ulcers and wounds in large hospitals, have become nearly at the same time affected with gangrenous mischief.

The *hospital gangrene*, as it is commonly called, is said to be produced by the putrid effluvia in hospitals, gaols, and ships, where the sick are crowded together in great numbers. "It is (observes Lassus) a true contagion, which is communicated to the wound, or ulcer, by the mere application of linen, or lint, that has been for a certain time in some place, where the air is impregnated with these deleterious miasmata. The impression made on the skin, throat, lungs, and intestinal canal, by such pernicious emanations, occasions gangrenous diseases, which are sometimes epidemic. This affection, the progress of which is so rapid, especially in cold damp weather, and in debilitated subjects, first shews itself locally in the form of greyish ash coloured spots, like the aphthæ, which appear on the surface of the ulcer. Such spots afterwards turn blackish, the vital powers sink, and the ulcer daily enlarges, emitting a most fetid smell." (*Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 37, 38.)

Mortification is very frequently occasioned by the injury, which parts sustain from the application of fire, and heated substances to them. When the heat is very great, the substance of the body is even decomposed, and of course killed at once. On other occasions, when the heat has not been so violent, nor sufficiently long applied, inflammatory symptoms precede the sloughing.

It is a curious fact, that the blood coagulates in the large arteries, which lead to a mortified part. This occurrence takes place for some distance from the slough, and is the reason, why the separation of a mortified limb is seldom followed by hemorrhage.

When gangrene and sphacelus take place, the patient is usually troubled with a kind of hiccough.

The constitution also suffers immediately a considerable dejection. The patient's countenance suddenly assumes a wild, cadaverous look; the pulse becomes small, rapid, and sometimes irregular; cold perspirations come on, and the patient is often affected with diarrhœa and delirium.

The generality of writers have distinguished gangrene and mortification, into the *dry* and *humid* kinds, according as the disordered part is found free from much moisture, or not. It does not appear, however, that such distinctions lead to any useful objects in practice. Cases, of what has been termed dry gangrene, never occur from inflammation. They commonly happen from the flow of blood to the parts affected being stopped by some kind of compression, or another, as by tumours, ligatures, or other similar causes, obstructing the principal arteries, which used to supply the parts now in a mortified state. Such causes, when the stoppage of the circulation is complete, always occasion a very slow mortification; and, as the parts in such instances, are no longer supplied with fresh quantities of fluids, while a considerable evaporation must be going on, there must be less humidity, than in other cases of mortification. (*B. Bell.*)

Authors have enumerated other varieties of mortification, as for instance, the *white gangrene*, in which the parts, supposed to be mortified, do not turn back, but retain nearly their former colour. (*Quesnay.*)

All mortifications spread in one of the following ways: either the living circumference sphacelates, without undergoing any previous perceptible changes, or the part first inflames, and then dies. The difference, in regard to the quickness, or slowness, with which sphacelus spreads, is exceedingly great, in different cases.

In cases of sphacelus, the prognosis chiefly depends on the nature of the cause of the disorder. The more easy the cause is of removal, the less room is there for alarm. It is an erroneous supposition, that mortification arising from an external local cause, is more easy to be stopped and cured, than that originating from an internal one. The local cause is sometimes exceedingly difficult, or even incapable, of removal; and a sphacelus, which is at first entirely local, may afterwards become a general disorder, by the universal debility, and derangement of the system, resulting from the absorption of putrid matter. Hence, it is obvious, that a sphacelus may easily extend beyond the bounds of its outward

local cause. On the other hand, a mortification may be reduced to one of a nature entirely local, though it arose at first from constitutional causes. Sphacelus from extreme debility, or from such a state of the system, as attends the scurvy, typhoid fevers, &c. is constantly perilous, because these causes are very difficult to remove. It is also a fact, that, when numerous causes are combined, it is an unfavourable occurrence, not merely because the surgeon is apt to overlook some of them, but, because there are in reality more obstacles to the cure.

There is a species of sphacelus, which spreads with very great rapidity, and, as the surgeon has scarcely time to employ the necessary means, the case is exceedingly dangerous. Sometimes, a mortification spreads so slowly, that it does not occupy much extent at the end of several months, or even a whole year. The case, however, is often not the less fatal on this account. The danger is never altogether over, until the dead part has completely separated. The entrance of putrid matter into the circulation is so injurious, that patients sometimes perish from this cause, long after the mortification has ceased to spread. (*Richter's Anfangsgr. der Wundarzn. Band* 1, *Kap.* 3 *p.* 78, 79.)

This last circumstance is very much insisted upon, by all the modern continental surgeons; but, I cannot pretend to determine, whether the doctrine is correct, or not. Certain it is, that few practitioners in this country entertain much apprehension of the bad effects of the absorption of putrid matter in cases of mortification.

The danger of sphacelus is also proportioned to the size and importance of the part affected. The event of the distemper likewise depends very much on the patient's age and constitution.

Parts, affected with gangrene, do not immediately lose the whole of their sensibility; the circulation is still continued in a certain degree; and when the progress of the distemper does not surpass certain bounds, the functions of such parts may be completely re-established. Gangrene, strictly speaking, is not a decided mortification; but, only the forerunner of this latter mischief, and may be regarded as the intermediate link, between the most violent stage of inflammation and sphacelus. The presence of this last implies the total loss of life in the part affected, the destruction of its organization, the abolition of all its functions, and an absolute inability to resume them again. However, even when we see a part manifestly sphacelated, we must not always conclude, that its entire destruction is certain; for, in many cases, the disorder only affects the skin and cellular substance. The integuments frequently slough away, and we have the happiness to perceive, that the tendons, muscles, and other organs, which they cover, remain perfectly sound, and leave room to entertain hopes of a cure.

It is easily comprehensible, that it is only in external affections of the body, that the progress of inflammation to gangrene and sphacelus can be marked with any degree of precision. But, as we have indeed already observed, the approaches of the latter are not invariably announced by the distinct and manifest symptoms of gangrene, even when the disorder is quite superficial. There are cases, which justify the conclusion, that a small part of the body may be affected with sudden death, just in the same manner as the whole machine. Sphacelus is often seen making its appearance in a part, which is apparently quite healthy, without being preceded by any other symptom, than a sudden acute pain in the seat of the mischief. Sometimes, in the earliest period of the complaint, a black spot, which rapidly spreads on every side, may be observed.

In order to be able to form a just prognosis, all the above circumstances must be taken into consideration, and, in particular, we must never deliver an opinion, without having closely examined the progress of the disorder; for, should we make a favourable prognosis from such appearances, as might justify us as much as possible in so doing, there is always great risk of finding ourselves most miserably mistaken by the event of the case. In all cases of considerable mortification, even when arising from an external cause, the patient cannot be deemed exempt from danger, not only while no separation of the mortified parts has begun, but, also, not before such parts have been completely detached from the sound ones. After the progress of mortification has ceased, patients have been known to perish suddenly, without there being a possibility of suspecting any other causes of this catastrophe, than the operation of putrid matter on the animal economy and nervous system after absorption.

TREATMENT OF MORTIFICATION.

We shall arrange under two heads what we have to say on the treatment of mortification. Under the first, we shall comprehend every thing, which relates to internal remedies, and such other general means, as are indicated by the general state of the system. Under the second, we shall speak of topical remedies, and of the local treatment of the parts affected.

GENERAL MEANS.

1. *Evacuations and Antiphlogistic Remedies.*

When mortification seems to depend on the violence of inflammation, the first indication is to moderate the inordinate action of the sanguiferous system, by the prudent employment of such means as are proper for counteracting inflammation. The subject is treated of in *Inflammation*, and it is not necessary to enter here into any repetitions. When bleeding has not been sufficiently practised, during the state of the inflammation antecedent to the mortification, and when the general symptoms, which point out the existence of this state, continue violent, and, especially, when the pulse is still quick, hard, or full, it is absolutely necessary to empty the vessels a little more, even though mortification has begun, particularly, if the patient be young and plethoric. Bleeding, by diminishing the fever, and abating the general heat, is frequently the best means of all. It may then be considered better, than all antiseptics, for stopping the progress of the disorder. But, this evacuation is to be employed with a great deal of circumspection; for, should it be injudiciously resorted to, from the true state of the system not being understood, the error may be followed by the most fatal consequences. It should also be well remembered, that how strongly soever bleeding may be indicated, the moment is commonly not long in coming, when this evacuation is totally inadmissible, especially when the mortification makes much progress.

What we have observed, concerning bleeding, is equally applicable to other evacuations, particularly those which are obtained by purgative medicines; and which become dangerous when they lower the patient's strength to a certain point, or when they are accompanied with too violent an irritation of the intestinal canal, operating sympathetically on the whole system. Emetics, the effects of which are always apt to be confounded, or compared, with those of purgatives, act in a very different and much more advantageous manner in cases of mortification, especially that species of the distemper, which arises in consequence of erysipelatous inflammation. Such, for example, is the inflammation, often seen in hospitals, in consequence of compound fractures, or other kinds of wounds. When this kind of inflammation makes its appearance, and even after the symptoms of mortification have begun to appear, an emetic, given in small repeated doses, so as to excite vomiting, is one of the best means of resisting the progress of the disorder. But, if, instead of occasioning vomiting, the medicine should only produce evacuations *per anum* as sometimes is the case, we must not persist in exhibiting it, lest it should prove, like every other cathartic, pernicious to the patient. A strict regimen, which may have been useful and even necessary, during the inflammatory stage, may also have a very bad effect, if continued too long, by diminishing the patient's strength, which, on the contrary, should be supported by the most nourishing food.

2. *Tonic and Antiseptic Remedies.*

This leads us to a second very essential and important indication to be fulfilled, as soon as the symptoms, announcing the existence of the inflammatory state, appear to abate, and the patient begins to be debilitated. This indication is to prevent excessive weakness by the suitable employment of cordials, and, particularly, of tonics. These same means also contribute to place the system in a proper state for freeing itself from the mortified parts, or, in other words, for detaching them. For, inflammation is the preparatory step, which nature takes to accomplish the separation of mortified parts from the living ones, and, such salutary inflammation cannot take place, if the energies of life be too much depressed in the rest of the system.

In order to fulfil the above indication, it is necessary to prescribe a nourishing diet, with a certain quantity of good wine, proportioned to the patient's strength, and the symptoms of the complaint. This diet is generally productive of more real benefit, than the whole class of cordial and stimulating medicines. However, when the patient is very much weakened, when the mortification of the part affected is complete, and the disorder is spreading to others, some of the following remedies may be ordered: volatile alkali; aromatic confection, &c. In general, however, wine is best; because more agreeable than cordials, and, for this purpose, one ought to prefer the most perfect wines, such as those of Spain and Madeira.

Of all the medicines, hitherto recommended for the cure of mortification, there is certainly not one, that has acquired such a character for efficacy, as the Peruvian bark. It is said, that this remedy often stops, in a very evident and expeditious manner, the course of the disorder. Being a very powerful tonic, it is thought to operate by strengthening the system, and thus maintaining in every part the necessary tone for resisting the progress of mortification. But, whatever may be its mode of acting, the advocates for this medicine contend, that it is now a well-known fact, that it ought

to be employed in almost all cases of mortification, as soon as the violence of the inflammatory symptoms has been appeased.

It was Mr. Rushworth, a surgeon at Northampton, who made this discovery in the year 1715. Amyand and Douglas, two surgeons in London, soon afterwards confirmed the virtue of this remedy. Mr. Shipton, another English surgeon, has also spoken, in the Philosophical Transactions, of the good effects, which he has produced by this medicine. In the Medical Essays, of Edinburgh, we find several cases, illustrative of the efficacy of bark in cases of mortification. We there are informed, that when its exhibition was interrupted, the separation of the eschars was retarded, and that, on the medicine being resorted to again, such a separation went on again more quickly. Since this period, all practitioners, both in England, and elsewhere, have had recourse to this remedy, which has every where obtained the highest praises. Unfortunately, these praises have induced surgeons to employ it indiscriminately, and with equal confidence, in all cases. Hence, the partial want of success, which occurred, led some to decry the Peruvian bark almost generally; until observations, made with the greatest care and circumspection, re-established its credit, by shewing the limits, beyond which, its efficacy is not to be depended upon.

We cannot indeed doubt, that bark has frequently had the most salutary effect, in cases of mortification, though sometimes it may probably have had imputed to it effects, which were entirely produced by nature. In many cases, however, bark is evidently hurtful, when exhibited prematurely. There are other instances, in which it is impossible to employ it in sufficient quantity, the stomach not being able to bear it in any form. In general, it should never be administered, when the pulse is high, and other inflammatory symptoms exist; but, when the tension of the part diminishes, the pulse sinks, when symptoms of weakness commence, and, particularly, when with these circumstances, we perceive a separation beginning to take place between the dead and living part, bark hardly ever fails to support the strength of the constitution, and powerfully to accelerate the separation of the mortified parts. (*Encyclop. Method. Art. Gangrene.*)

However, as we have already remarked, it is quite wrong to prescribe bark, in every instance, as the sole remedy; for, there are many cases, in which it is unnecessary; some, in which it does harm; and others, in which it is totally inefficacious. It is a medicine obviously of no service, when the mortification arises from an external cause, and is the only complaint, in a healthy, strong constitution. It is equally unnecessary, when the sphacelus is of the dry sort, and has ceased to spread, at the same time, that the living margin appears to be in a state of inflammation, without any universal debility. But, it deserves particular notice, that the circumstances of each individual case are liable to such considerable variation, that though bark may be at first unnecessary, it may afterwards be indicated.

In some cases of sphacelus, bark is hurtful. The disorder is generally attended with fever, which may be of three kinds; inflammatory; typhoid; or one connected with a disordered state of the abdominal viscera.

In the latter case, which is far more common, than is supposed, bark is obviously pernicious. Here, the indication is to empty the stomach and bowels, as quickly as possible. When this has been done, and bark should now be indicated by any of the circumstances, already pointed out, it may be safely administered. But, there is a great necessity, for procuring evacuations, as speedily as possible, before great debility has come on.

Sometimes, mortification is accompanied with a low typhoid kind of fever, which, whether the cause, or the consequence of the local mischief, demands the exhibition of bark.

As we have above stated, the common inflammatory fever may attend a mortification, and then the living margin is generally inflamed and painful. This is particularly the case, when mortification is the consequence of genuine acute inflammation, or of an external injury, in a healthy subject. Here, bark must obviously be injurious. Still, it is wrong to regard this medicine, as invariably hurtful, whenever sphacelus is the effect of inflammation. It has already been observed, that the inflammation frequently has less share in the origin of the disorder, than some incidental cause, which oftentimes requires the exhibition of bark. It is also to be noticed, that even when mortification is the pure effect of inflammation, great prostration of strength may subsequently arise, or else constitutional symptoms in consequence of the absorption of putrid matter, and in both these instances, the voice of experience loudly demands the employment of bark, though its exhibition might have been at first useless or hurtful. While the genuine inflammatory fever, and local inflammation, attend mortification, antiphlogistic means are undoubtedly useful. However, great caution is requisite in employ-

ing them, since, in cases of humid gangrene, as it is termed, the inflammatory state very soon changes into one, resembling that of typhus fever, &c.

Sometimes, there is mere prostration of strength, without any symptom of disorder in the gastric system, or of inflammation, or typhoid fever. A nervous fever is of this kind. In this instance, bark is evidently proper, though seldom effectual alone. Volatile, diaphoretic, and nervous medicines, are commonly at the same time proper, and opium, wine, and the volatile alkali, are such as experience has selected, together with the application of blisters.

From the preceding observations, it becomes evident, that though the method of treatment in cases of sphacelus, depends on the occasional cause, yet, it must also be regulated by the kind of fever, which, as we have described, may be either inflammatory, typhoid, one connected with gastric disorder, or nervous. Consequently, there are four plans of constitutional treatment, and it is easy to determine the particular cases, in which bark is unnecessary, hurtful, or inefficacious.

We meet with one species of mortification; in which the patient experiences severe pain in the part, without the smallest appearance of inflammation. Here bark is never of any use, and opium is probably the only medicine of any efficacy. We shall consider this subject more fully presently, when we introduce Mr. Pott's remarks on a peculiar mortification of the toes and feet.

Bark sometimes occasions purging, and then it also proves inefficacious, and hurtful. This effect, however, may frequently be prevented by adding a few drops of laudanum to each dose.

Bark may disagree with the stomach; but, it very seldom does so, when given in exceedingly fine powder, which also generally proves more efficacious, than a coarse one. Administering it with wine, some aromatic water, or in the form of the cold infusion, makes the medicine likewise less likely to disorder the stomach. (*Richter. Anfangsgr. der Wundarzn. Kap.* 3.)

The vitriolic acid may frequently be advantageously given at the same time with the bark, and the best method of exhibiting it is to acidulate with it every thing, which the patient drinks. Other acids are also sometimes used for the same purpose.

Carbonic acid gas is another remedy of the highest efficacy in all cases of mortification. It has even been known to have the most beneficial effects when bark has failed in doing good. Water impregnated with this gas should be recommended, as a most beneficial kind of drink.

Such are the remedies, which have acquired the greatest confidence of practitioners, when the indication is to support and strengthen the constitution, with a view of resisting the progress of mortification. A great many others have been recommended, but, there are none, which, in point of efficacy, can be compared with those abovementioned.

The *hospital gangrene*, is a case, for which bark is universally allowed to be a medicine of the highest efficacy. It is not only to be given internally, but employed as a lotion for the ulcers, with the addition of camphorated spirit of wine. In the hospital gangrene, however, one of the most essential measures is to purify the air, in which the patient is residing. As much fresh air as possible should be let into the ward, or room; fumigations of nitric and oxygenated muriatic acids should be used, not only for disinfecting the place, but as an application to the gangrenous disease. The nitric acid fumigations are made by putting into a glass vessel on the ground, half an ounce of concentrated sulphuric acid, to which an equal quantity of nitre is to be added *gradatim*. The mixture is to be stirred with a glass tube, when an abundance of white vapour will be produced.

The oxygenated muriatic acid fumigations are made, by mixing three ounces two drams of common salt with five drams of the black oxide of manganese in powder. These two ingredients are to be triturated together; they are then to be put into a glass vessel; one ounce two drams of water are to be added, and then, if the ward, or chamber be uninhabited, one ounce seven drams of sulphuric acid are to be poured upon the mixture all at once; or, gradually, if the patients are there. This quantity will be sufficient for disinfecting a very large ward. (See *Lassus Pathologie Chirurgicale, Tom.* 1. *p.* 38, 39.)

3. *Anodyne Remedies.*

A third indication, which should be observed together with the second, or which, should even precede it in many instances, is to lessen the irritability and sufferings of the patient, by the use of opium. Attention to this desideratum frequently contributes more than any thing else, to stop the progress of the disorder, and is often indispensable in order to promote the operation of other remedies. In all cases of mortification, every thing, which heats, irritates, or adds to the patient's sufferings, appears, in general, to augment the disorder, and increase the rapidity of its progress. On the other hand, every thing which tends to calm, assuage, and relax, almost always retards the progress of mortification, if it

produce no greater good. The pain also, which is a constant mark of too much irritation, contributes of itself to increase such irritation, and, in this double point of view, we cannot do better, in the majority of cases, than endeavour to appease it by the more or less liberal use of opium. —When the inflammatory stage evidently prevails, this medicine may be conjoined with antiphlogistic remedies, such as neutral salts, and, particularly, nitre. In other instances, attended with debility, it may be given with bark and cordials.

The following observations on the efficacy of opium in a particular, and not unfrequent case, are highly entitled to the attention of every surgical practitioner. The disease is also described with that accuracy and elegance, which always distinguish the writings of Mr. Pott.

"The powers and virtues of the Peruvian bark are known to almost every practitioner in physic and surgery. Among the many cases in which its merit is particularly and justly celebrated, are the distempers called gangrene and mortification; its general power of stopping the one, and resisting the other, have made no inconsiderable addition to the success of the chirurgic art; but still there is a particular species even of these, in which this noble medicine most frequently fails: I mean that particular kind, which, beginning at the extremity of one or more of the small toes, does, in more or less time, pass on to the foot and ankle, and sometimes to a part of the leg, and, in spite of all the aid of physic and surgery, most commonly destroys the patient.

"It is very unlike to the mortification from inflammation, to that from external cold, from ligature, or bandage, or to that which proceeds from any known and visible cause, and this as well in its attack as in its process. In some few instances, it makes its appearance with little or no pain; but, in by much the majority of these cases, the patients feel great uneasiness through the whole foot and joint of the ankle, particularly in the night, even before these parts shew any mark of distemper, or before there is any other, than a small discoloured spot on the end of one of the little toes.

"It generally makes its first appearance on the inside, or at the extremity, of one of the smaller toes, by a small black, or blueish spot; from this spot the cuticle is always found to be detached, and the skin under it to be of a dark red colour.

"If the patient has lately cut his nails, or corn, it is most frequently, though very unjustly, set to the account of such operation.

"Its progress in different subjects, and under different circumstances, is different; in some it is slow and long in passing from toe to toe, and from thence to the foot and ankle; in others its progress is rapid, and horridly painful: it generally begins on the inside of each small toe, before it is visible either on its under or upper part; and when it makes its attack on the foot, the upper part of it first shews its distempered state, by tumefaction, change of colour, and sometimes by vesication; but wherever it is, one of the first marks of it is a separation or detachment of the cuticle.

"Each sex is liable to it; but for one female in whom I have met with it, I think I may say, that I have seen it in at least twenty males. I think, also, that I have much more often found it in the rich and voluptuous, than in the labouring poor; more often in great eaters, than free drinkers. It frequently happens to persons advanced in life, but is by no means peculiar to old age. It is not, in general, preceded or accompanied by apparent distemperature either of the part, or of the habit. I do not know any particular kind of constitution which is more liable to it than another; but as far as my observation goes, I think that I have most frequently observed it to attack those, who have been subject to flying uncertain pains in their feet, which they have called gouty, and but seldom in those who have been accustomed to have the gout regularly and fairly. It has, by some, been supposed to arise from an ossification of vessels; but for this opinion I never could find any foundation but mere conjecture.

"The common method of treating this distemper is, by spirituous fomentations, cataplasms, actually and potentially warm, by dressings of the digestive kind, as they are called, animated with warm, pungent oils and balsams, &c. and, internally, by the Peruvian bark.

"I wish I could say that this, which, with little alteration, has been the general practice, had been most frequently, or even often successful; but I am, from long and repeated experience, obliged to say, that it has not.

"I am sensible, that many of my readers will be surprised at my affirming, that the Peruvian bark will not stop a mortification, a distemper in which, for some years, it has been regarded as specific; but I must beg not to be misunderstood: I mean to confine my observation and my objection to this particular species of mortification, which I regard as being sui generis; and under this restriction I must repeat, that I have seldom, if ever, seen the bark successful: in all other cases, wherein it is used or recommended, no man has a higher opinion of it; but, in this I cannot give it a praise, which it does not deserve.

"I believe I may venture to say, that I have tried it as fairly, as fully, and as variously as any man has or can; I have given it in the largest quantity, at the shortest intervals, and for the longest possible space; that is, as long as the patient's life would permit: I have given it by itself in decoction, extract, and substance; I have combined all these together; I have joined it with nitre, sal. absynth. with snake root, with confect. cardiac. with volatile salts, and with musk, as different circumstances seemed to require, or admit; I have used it as fomentation, as poultice, as dressing; I have assisted it with every thing which has been usually thought capable of procuring or assisting digestion; still the distemper has continued its course, perhaps a little more slowly, but still it has ended in death.

"I am sorry to rob one of our great medicines of any part of its supposed merit, but as on the one hand, its claim, in this instance, is unjust, and as on the other, I hope to add as much to the character of another, the res medica will be no sufferer.

"Some time ago, I had a patient labouring under this complaint, who, from antipathy, obstinacy, or some other cause, could not be prevailed on to take bark in any form whatever. I made use of every argument, but to no purpose: fomentation, poultice, and the usual dressings were applied in the usual manner: the disease advanced some days more, some days less, and at the end of a fortnight, the small toes were all completely mortified, the great one became blackish, the foot much swollen, altered in colour, and the disease seeming to advance with such hasty strides, that I supposed a very few days would determine the event. The pain in the foot and ankle was so great, and so continual, as totally to deprive the patient of sleep. On this account, and merely to procure some remission, I gave two grains of opium at night, which not having the desired effect, I repeated it in the morning. Finding, during the following day, some advantage, I repeated the same dose night and morning for three days; at the end of which time the patient became quite easy, and the appearances on the foot and ankle were visibly more favourable. Encouraged by this, I increased the quantity of the medicine, giving one grain every three or four hours, taking care to watch its narcotic effect, and to keep the belly empty by glysters. In nine days from the first administration of the opium, all the tumefaction of the foot and ankle totally subsided, the skin recovered its natural colour, and all the mortified parts plainly began to separate; in another week they were all loose, and casting off, the matter was good, and the incarnation florid. During the whole of this time, I continued the use of the opium, varying its quantity as circumstances required, but never gave less than three or four grains in twenty-four hours.

"When the sloughs were all cast off, the bones separated, and as I had only a clean sore to dress and heal, I gradually left off the medicine.

"I am very willing to acknowledge, that however well-pleased I might be with the event of this case, yet I really regarded it as accidental; so much so, that having very soon after another opportunity, I did not care to trust to opium alone, but joined the bark with it. The event was equally fortunate. But although I had joined the cortex with the extractum thebaicum, and did therefore attribute the success to their united powers, yet the effect was so very unlike to what I had ever seen from the bark without opium, that I could not avoid seriously, and often reflecting on it, and determining to use it by itself, whenever another opportunity should offer. I did so, and succeeded in the same happy manner, though under the very disagreeable circumstances of seventy years of age, a broken, distempered constitution, and the disease making a hasty progress.

"To relate cases which are nearly, or at least materially similar, is of no use: I shall therefore only say, that every opportunity, which I have had since of making the experiment, has still more and more convinced me of the great value and utility of this medicine, and of its power of rescuing from destruction, persons under this affliction.

"I cannot say that it has never failed me: it certainly has; but then it has been under such circumstances, as I think would fairly account for the failure.

"I should be exceedingly sorry to be misunderstood; I should be still more so to mislead any body: and therefore I beg it may be noticed, that I do not propose the extractum thebaicum, in this case, as an universal infallible specific; I know, from experience, that it is not; but as I also know, from repeated experience, that it will, under proper management, and direction, do more than any, or than all other medicines; and that I have, by means of it, saved some lives, which I am very sure, would, under the common, and most approved method of treatment, without it, have been lost, I could not answer to myself the not communicating what I had observed.

"If this was an experiment, in which the life or limb, or health of the patient, was in any degree endangered, or by which the person, on whom it may be

tried, could, in any degree, be injured, I should have withheld what I now publish, until a greater length of time, and more experience, had rendered it still more absolutely certain; and I should have thought myself strictly vindicable in so doing: but as this is a medicine whose general effects are well known, and which is, at the same time, so capable of direction and management, that it is almost impossible for any person who deserves to be trusted with medicine at all, to do any material harm with it, I thought it would be wrong and unjust to conceal what had occurred to me, lest I might thereby deprive the afflicted of an assistance which, I verily believe, is not to be obtained from any other quarter.

"In short, from what I have seen and done, I am perfectly convinced that by its means, and by its means solely, I have saved lives which, without it, must have been lost.

"If it preserves a few of those who are so unfortunate as to labour under this nasty, painful, lingering, and destructive disorder, to which we are all liable, and which has hitherto, most frequently, foiled all attempts of art, I shall be sincerely glad to have contributed to so good an end: if it should prove in other hands as successful as it has with me, I shall be still more so; but, on the other hand, if, after several times giving me reason to believe and hope that it would prove an instrument for the preservation of many, it should, upon more repeated trial, be found to fail, I shall be sorry for the event, but shall still think, that I did right in communicating what I had seen, and thereby endeavouring to be useful to mankind.

Hoc opus, hoc studium; parvi properemus et ampli,
Si patriæ volumus, si nobis vivere cari.

"If I am right in my conjecture concerning this hazardous and destructive malady; and if the method which I have proposed and practised, should prove as successful in the hands of others as it has in mine, I cannot help thinking, that the external or chirurgic treatment of the disorder might be amended; that is, might be made to coincide more than it does at present with such soothing kind of plan.

"Since I have had reason to embrace this opinion, and to act in conformity to it, I have found more advantage from frequently soaking the foot and ankle in warm milk, than from any spirituous, or aromatic fomentations whatever; that is, I have found the one more capable of alleviating the pain, which such patients almost always feel, than the other; which circumstance I regard as a very material one. Pain is always an evil, but, in this particular case, I look upon it as being singularly so. Whatever heats, irritates, stimulates, or gives uneasiness, appears to me always to increase the disorder, and to add to the rapidity of its progress; and, on the contrary, I have always found, that whatever tended merely to calm, to appease, and to relax, at least retarded the mischief, if it did no more.

"The whole plan of the chirurgic treatment of this disease is founded on a general idea of warming, invigorating, stimulating, and resisting putrefaction; and the means generally made use of are very proper for such purpose: but I must own that I think the purpose, or intention, to be improper.

"Upon this principle, the old theriaca Londinensis, and the present cataplasma è Cymino, have been, and still are, so freely used on this occasion. A composition of this kind, if it does any thing, must heat, and stimulate, and it is by heating and stimulating the skin, to which it is applied, that it so frequently does that mischief which I am confident it often does, though such mischief is set to the account of the nature of the disorder. Cases exactly similar, in all circumstances, are not to be met with every day, but I am from experience convinced, that of two, as nearly similar as may be, in point of pain, if the one be treated in the usual manner, with a warm, stimulating, cataplasm, and the other only with a poultice made of the fine farina seminis lini, in boiling milk or water, mixed with ung. sambuc. or fresh butter, that the pain, and the progress of the distemper, will be much greater and quicker in the former than in the latter.

"When the black or mortified spot has fairly made its appearance on one or more of the toes, it is the general practice to scarify or cut into such altered part with the point of a knife or lancet. If this incision be made merely to learn whether the part be mortified or not, it is altogether unnecessary, the detachment of the cuticle, and the colour of the skin, render that a decided point: if it be not made quite through the eschar, it can serve no purpose at all: if it be made quite through, as there is no confined fluid to give discharge to, it can only serve to convey such medicines as may be applied for the purpose of procuring digestion to parts capable of feeling their influence, and on this account they are supposed to be beneficial, and therefore right.

"When the upper part of the foot begins to part with its cuticle and to change colour, it is a practice with many to scarify immediately; here, as in the preceding instance, if the scarifications be too superficial, they must be useless; if they be so deep, as to cause a slight hemorrhage, and to reach the parts which have not yet lost their sensibility, they must do

what indeed they are generally intended to do, that is, give the medicines, which shall be applied, an opportunity of acting on such parts.

"The medicines most frequently made use of for this purpose are, like the theriaca, chosen for this supposed activity; and consist of the warm, pungent oils and balsams, whose action must necessarily be to stimulate and irritate: from these qualities they most frequently excite pain, which, according to my idea of the disease, is diametrically opposite to the proper curative intention; and this I am convinced of from repeated experience.

"The dressings cannot consist of materials which are too soft and lenient; nor are any scarifications necessary for their application. But I would go farther and say, that scarifications are not only useless, but, in my opinion, prejudicial, by exciting pain, the great and chiefly to be dreaded evil in this complaint. The poultice should be also soft, smooth, and unirritating; its intention should be merely to soften and relax; it should comprehend the whole foot, ankle, and part of the leg; and should always be so moist or greasy as not to be likely to become at all dry or hard, between one dressing and another.

"I will trouble the reader with only one remark more.

"When the toes are, to all appearance, perfectly mortified, and seem so loose as to be capable of being easily taken away, it is, in general, thought right to remove them. However rotten and loose they may seem to be, or really are, yet while they hold on, they hold by something which is still endued with sensation, as may always be known, if they be bent back or twisted with any degree of violence.

"I will not enter into a dispute about the sensibility or insensibility of ligaments, nor undertake to determine whether they be ligaments or any other kind of parts which still maintain the connexion of the toes with their own respective joints, or with the metatarsal bones; it is sufficient for me to know, and to inform the young practitioner, that however loose they may seem, yet if they be violently twisted off, or the parts, by which they hang, be divided, a very considerable degree of pain will most commonly attend such operation, which therefore had much better be avoided; and that I have seen this very pain, thus produced, bring on fresh mischief, and that of the gangrenous kind.

"If the patient does well, these parts will certainly drop off; if he does not, no good can arise from removing them."—(*Pott's Works.*)

Other practitioners have confirmed, by their experience, the efficacy of opium, in cases, in which the disorder is attended with a great deal of irritation, though it may not always have had the same success in their hands, when the mortification has appeared to depend chiefly on constitutional debility. Mr. Kirkland observes, that we must be careful not to force the doses, especially at first; and that the medicine does more harm, than good, when its soporific effects go so far as to occasion delirium, take away the appetite, or cause affections of the heart.

Some authors have also recommended the use of camphor, which, by reason of its narcotic virtue, has sometimes produced good effects. M. Pouteau attributes considerable efficacy to it, especially, in the erysipelatous gangrene arising from wounds. In such cases, he recommends it to be given in the dose of five grains, with a double quantity of nitre, every four hours. (*Encyclopédie Methodique; Partie Chirurgicale.*)

LOCAL MEANS.

1. *Suppression of Irritating Causes.*

With respect to the external, or local treatment of mortification, the first indication consists in removing, if possible, such external causes, as may have occasioned, or kept up the disorder. Such are all those causes, which originate from the compression of ligatures, tumours, &c. Of this kind, also, are all irritating, and poisonous substances, which by their presence stimulate the parts, more or less violently, according to their particular nature.

2. *Topical Applications.*

When mortification arises from inflammation, which still prevails in a considerable degree, it is evident, that the dead part itself only claims secondary consideration, and that the principal desideratum is to prevent the mortification from spreading to the living circumference, by lessening the inflammation present. Hence, under such circumstances, the application of linen, wet with the saturnine lotion, and the maintenance of a continued evaporation, from the inflamed parts surrounding the mortified ones, must be just as proper as if the mortification itself did not exist, and were quite out of all consideration.

It has been justly remarked by a most eminent man, (*Hunter*) that the local treatment of mortification, (meaning that in consequence of inflammation) has been as absurd as the constitutional; scarifications have been made down to the living parts, that stimulating and antiseptic medicines might be applied to them; such as turpentines, the warmer balsams, and

sometimes the essential oils. Warm fomentations have been also applied, as being congenial to life; but, warmth always increases action, and should, therefore, be well adjusted to the case; for on the other hand, cold debilitates or lessens powers, when carried too far, though it first lessens action. Stimulants are likewise improper, as the actions are already too violent. It is proper to keep the parts cool, and all the applications should be cold. In cases of mortification from inflammation, good effects have also been seen to arise from the topical, as well as internal employment of opium.

But it must be acknowledged, that how proper soever the employment of cold applications is, in cases of mortification, attended with inflammation, fomentations and emollient poultices are most commonly preferred.

Besides common poultices, there are several others, which have acquired great celebrity, as topical applications in cases of mortification. Of this kind are the cataplasma carbonis,* cataplasma cerevisiæ,† and the cataplasma effervescens‡. These local remedies are, perhaps, in nine cases out of ten, superior to all others.

With respect to stimulating, and spirituous applications, such as brandy, spirit of wine, balsams, resins, and aromatic substances, which have been recommended by a vast number of authors, they are at present almost entirely laid aside by practitioners. Though such things are indeed really very useful in preserving dead animal substances from becoming putrid, very little knowledge of the animal economy is requisite to make us understand, that they cannot act in this manner on parts still endued with vitality; but, on the contrary, that they must have very prejudicial effects, in the cases under consideration, by reason of the violent irritation, which they always excite, when applied to the living fibres. It may now and then, however, be justifiable to apply spirituous applications to the dead parts themselves with a view of diminishing the fetid effluvia, which, by contaminating the air, have some share in injuring the patient's health; but the greatest care is requisite to keep these stimulants from coming into contact with the living surfaces around, and beneath the sloughs.

When mortification arises from cold, every sort of warm emollient application must be avoided, and cold water, or even snow or ice, made use of. For this subject, however, See *Chilblains*.

The local treatment of the mortification of the toes and feet, described by Mr. Pott, has been already considered.

3. *Scarifications, and Removal of the mortified Parts.*

Another grand indication is to give vent to putrid matter, extravasated in the cellular substance, by making deep scarifications in the integuments. The majority of authors who have treated of mortification, have very much insisted upon this plan, which they recommend in all kinds of cases. They even advise the incisions to be made down to the sound parts, in order to facilitate the application of topical stimulants, and to favour the operation of the supposed antiseptic qualities of such applications. But, with the exception of cases, in which gangrene affects some aponeurotic membrane, and others in which the integuments, already mortified, are exceedingly distended with putrid matter collected in the cellular substance, either in consequence of foregoing inflammation, or any other cause, such as the extravasation of urine in the scrotum, all scarifications, which penetrate as far as the living parts, are often productive of most serious mischief, instead of advantage. Such incisions cannot be practised, without occasioning a great deal of pain, and producing inflammation, which itself often powerfully contributes to make the mortification spread. But, as parts, which are in a complete state of sphacelus, are absolutely extraneous substances, in regard to those which still retain their vitality, they require no concern, and when their mass is considerable, it is not only proper to scarify them, but, also to remove a portion of them. By lessening the size of the putrid mass of matter, the fetor is diminished, which, in this case is always considerable; we also make way for the escape of a great deal of putrid discharge, which, being confined, might have a bad effect on the neighbouring living parts; and we enable these latter to free themselves more easily from the rest of the sloughs.

From what has been already said, it must appear, that scarifications are only to be employed with the greatest prudence, lest they should increase the disorder, which they are intended to benefit.

The same may be said of the too common practice of accelerating, with a cutting instrument, the separation of the mortified

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* Prepared by mixing about ℥ij. of finely powdered wood-charcoal with half a pound of the common linseed poultice.

† Prepared by stirring into the grounds of strong beer as much oatmeal, as will make the mass of a suitable consistence.

‡ Prepared by stirring into an infusion of malt as much oatmeal, as will render the substance of a proper thickness, and then adding about a spoonful of yeast.

parts, which process nature tends to accomplish. It is always dangerous to irritate parts, which are affected with inflammation, in cases of sphacelus, before they are completely restored to their natural state, and in having recourse to the above-mentioned operation, while there is any adhesion remaining, between the slough and the living parts, it is impossible to avoid producing irritation in the latter. We have already given Mr. Pott's sentiments, with respect to the danger and inutility of cutting the tendons and ligaments, in the mortification of the toes and feet.

If the surgeon prudently await the event of things, the separation of the mortified from the living parts, will in general be soon effected, when an inflammation and suppuration at the edges of the slough, have set bounds to the expansion of the sphacelus, and which inflammation and suppuration will also contribute to the detachment of the slough. The other mode of practice is the above one, viz. the amputation of what is mortified.

Although the certainty and expedition of the knife have the semblance of being infinitely preferable to the uncertain, and tedious, mode of procuring a detachment of a mortified part, by the occurrence of suppuration and the action of the absorbents, which remove the particles, connecting the dead and living matter together, yet cutting away parts, in cases of sphacelus, is not, very frequently, proper. The incision can only be performed in the living, or dead part. In attempting the latter, we are ignorant of the precise extent of the disorder. Sometimes the sphacelus is more extensive towards the surface, than in a deeper situation. There is also a constant risk of injuring the living parts, and thereby occasioning very unfavourable symptoms. If this should not occur, still there will remain, after the operation, a considerable portion of the mortified part, for the detachment of which as much inflammation, suppuration, and time, will be requisite, as if no operation had been undertaken. If the operation have any use, it is that of lessening the bulk of the slough, and thereby diminishing the fetid effluvia.

Amputation, performed in the living part, removes one danger by incurring a still greater one. Of this no doubt can be entertained, when we reflect, that this important operation has often a fatal event, even when performed under the most propitious circumstances, and that, in the cases now under consideration, it must commonly be undertaken on a subject, in a state of extreme debility. Besides, there is never any certainty, that we are amputating in living parts. Mortification rapidly ascends along the cellular substance, surrounding the large blood-vessels, and is frequently much more extensive internally, than external appearances would lead one to suppose. The adjacent surface, still apparently alive, is often so affected, that it must inevitably slough, though, at present, it may not actually have sphacelated. The surgeon imagines, that amputation is performed on living parts; but, soon afterwards discovers, that he has been dividing those, which are dead. (*Richter's Anfangsgr. der Wundarzneykunst, Band.* 1, *Kap.* 3.)

The operation can do no good, while the mortification is in a spreading state, and it may do considerable mischief. The disorder enlarges its limits, because its cause still operates, and this is not removeable by amputation. If the operation be now injudiciously undertaken, the sphacelus invades the wound, and is the more certainly mortal, as the patient has now been further weakened by amputation, and its consequences.

Many mortifications, especially those, which arise from external causes, very often spontaneously stop and separate. But, the place, where this will happen, can never be foreseen. By amputating in this circumstance, we run a risk of disturbing nature in her salutary work, and rendering the disorder fatal: and the operation, considered in the most favourable point of view, is a most useless one. It is rational to believe, that, whenever amputation has been successfully practised in the living part, while a sphacelus was in a spreading state, the complaint would have stopped of its own accord, and the patient been preserved without the operation. Since amputation, also, plainly renders the patient's condition unfavourable, we may infer, that many persons have died after its performance, who might have been saved without it.

As soon as a sphacelus leaves off spreading, and begins to separate, the greatest danger is over. To practise amputation now in the living part, is manifestly hurrying the patient unnecessarily into fresh peril, just after he has escaped from a most dangerous situation. However, should the operation be done, and the patient live, the cure is not in the least accelerated, as the healing of the wound will require as much time, as the detachment, and perfect cure of the mortification.

The following are cases, in which, perhaps, the use of the knife is justifiable and proper. There exists a species of sphacelus, which rapidly occasions death, before it is yet of great extent. Here indeed, amputation might be really advisable; but, the nature of the case is unfor-

tunately never disclosed, before the fatal catastrophe. Some external injuries are inevitably followed by mortification. In such cases, amputation is evidently proper; for, the simple incision is attended with less danger, than the sphacelus would be. The surgeon, however, seldom knows beforehand, that mortification will inevitably ensue.

When the mortification has already ceased spreading, or begun to separate; or, when the cause of the disorder is removed; one may, at all events, cut off some of the slough. By this means, we shall succeed in diminishing the nuisance and unwholesomeness arising from the putrid effluvia. It is only necessary to be careful, not to injure the living parts, so as to occasion pain and hemorrhage.

In cases, in which a whole limb has mortified, and the soft parts have already been detached, the separation of the denuded bone is the only thing remaining to be done; and this may be accomplished in the usual way with a saw. But, we are to remember, that we thus only free the patient from the fetor of the sphacelated limb, and neither accelerate the cure nor obtain any other essential advantage. The death of the bone generally extends rather far upward, and, consequently, the saw can seldom remove the whole of the dead portion, some of which must remain for nature to detach. The same length of time will be requisite for this exfoliation to be effected as if none of the bone had been sawn off. When the sphacelus is of the dry description, and produces no inconvenience from fetor, the employment of the saw is even unadvisable.

From what has been said, it appears, that in the majority of cases, the surgeon must abandon the separation of a mortified part to nature, and confine his endeavours to checking the progress of the disorder.

Sometimes, a sphacelus spontaneously ceases to spread. This happens most frequently in cases which originate from an external cause, such as a violent contusion, burn, &c. But, the occurrence is not restricted to this kind of case, nor is it invariably attendant on it. When there are no other occasional causes present, the mortification does not readily go beyond the limits of the contusion, or violent burn; but the interference of surgery can hardly ever put a stop to its progress, before it has spread as far as the extent of the local injury. (*Richter's Anfangsgrunde der Wundarzneykunst, Band.* 1, *Kap.* 3.)

How different are the doctrines of M. Larrey upon this subject from those entertained by Richter, and, indeed, the generality of eminent modern surgeons. "Writers on gangrene, or sphacelus of the extremities (observes M. Larrey) indiscriminately recommend the amputation of a sphacelated limb never to be undertaken before the mortification is bounded or limited by a reddish circle, forming a true line of separation between the dead and living parts. This circumstance can only occur in a case of spontaneous gangrene from an internal cause; or if it happens, as is very unusual, in a case arising from a wound, its progress is different, and it would be exceedingly imprudent to wait for it. *The gangrene from external injuries almost always continues to spread; the infection becomes general; and the patient dies.*" (*Larrey in Mém. de Chirurgie Militaire, Tom.* 3, *p.* 142.) On the other hand, this author asserts, that, in the dry, or spontaneous gangrene, absorption takes place with more difficulty, and it is not uncommon to see the sphacelated parts separate from the living ones by the powers of nature alone, without the general functions being impaired. He argues, that there is a manifest difference, between what he terms the *traumatic* and the *spontaneous*, gangrene, or, in other words, between the *humid* gangrene from an external cause, and the *dry* gangrene, which ordinarily proceeds from an internal cause. (*P.* 148.)

In cases of mortification arising from external injuries, M. Larrey maintains, that, "notwithstanding any thing that writers and practitioners may allege to the contrary, we should not hesitate about promptly performing amputation, as soon as the necessity for the operation is decidedly established. There is no reason to apprehend, that the stump will be seized with gangrene, as in the spontaneous mortification, that has not ceased to spread, because the traumatic gangrene, after having arisen from a local cause, is only propagated by absorption, and a successive affection of the texture of parts, by continuity of the vessels. Amputation, performed in a proper situation, stops the progress and fatal consequences of the disorder.

"Supposing then the lower half of the leg should be affected with sphacelus, in consequence of a gunshot injury, attended with a violent contusion of the part, and a forcible concussion of the vessels, nerves, and ligaments, if the skin is elsewhere uninjured, the operation may be done in the place of election, without any fear of the stump becoming gangrenous, notwithstanding the cellular membrane of the upper part of the member may be already affected. But, when the skin of the whole leg is struck with mortification the operation must be done on the thigh

and no time should be lost. The same practice is applicable to the upper extremities. We must be careful not to mistake a limb affected with stupor for one that is actually sphacelated. In the first case, warmth, motion, and sensibility are still retained, although the skin may be blackish and the parts may be swollen. Besides, if there were any doubt, it would be proper to try at first tonic repellent applications, and cordial medicines, &c. (*Larrey in Mém. de Chirurgie Militaire, Tom.* 3, *p.* 152, 153.)

"When amputation has been practised, this author recommends the exhibition of bark, good wine, tonics, &c. in order to promote the good effects of the operation. (*P.* 154.)

"The facts, (says M. Larrey) which I shall relate in the course of this dissertation, will prove, I think, in an incontestable manner, the truth of the principle, which I lay down, that, *when gangrene is the result of a mechanical cause, and puts the patient's life in danger, amputation ought to be performed, without waiting until the disorder has ceased to spread.*

"I have been a witness of the death of several individuals, from too rigorous an adherence to the contrary precept; and at length grievously impressed with this loss, I had long ago determined to depart from an axiom, which was always considered by me as false. Besides, following the maxim of Celsus, I preferred employing an uncertain remedy, rather than abandon the patient to an inevitable death. *Satius est enim anceps auxilium experiri quàm nullum.*

"I made the first attempt at Toulon, in the year 1796, upon a soldier, who, in consequence of a violent contusion of the foot, was afflicted with a gangrenous ulcer, which soon threw the whole limb into a sphacelated state. While the mortification was yet spreading, I resolved to amputate the leg. The success of the operation surpassed my expectations; the stump healed; and, in less than forty-five days, the patient got quite well. This case served to encourage me.

"During the siege of Alexandria, in Egypt, in 1801, a second case, very analogous to the preceding, occurred in my practice; it happened in a dragoon of the 18th regiment, whose forearm and afterwardsarm sphacelated, in consequence of a gunshot wound in the articulation of the left arm. The mortification had extended nearly as high as the shoulder, and the patient's life was in great danger, when I determined to amputate the limb at the shoulder-joint. The disorder was manifestly spreading, and the patient's brain already affected, for he had symptoms of ataxia: the operation, however, arrested the progress of the sloughing, and saved the patient's life, who, at the conclusion of the siege of Alexandria, was quite cured.

"After the taking of Ulm, M. Ivan, surgeon to his Majesty the Emperor, performed in my presence, and at my ambulance established at Elchingen, the amputation of the thigh of a soldier belonging to the 76th regiment of the line, the leg having sphacelated in consequence of a gunshot injury. The gangrene was not limited, and evidently continued to extend itself: notwithstanding this the effects of the infection were destroyed, and the patient was quite cured on our return to Austerlitz.

"A fourth patient, an officer in the same regiment, shot in the ankle, at the capture of the same town, was conveyed to my ambulance, in order to be dressed: it was the third day after the accident; the foot was gangrenous, and the leg was swelled and threatened likewise with mortification. Febrile symptoms had also come on. I hastened to amputate the leg a little above the place of election. The cellular membrane of the stump, of a yellow blackish colour, was already infected with the gangrenous principle, (as M. Larrey terms it.) The operation, however, stopped the progress of the mischief; suppuration took place in the stump; some sloughs were detached; the wound assumed a cleaner appearance; and cicatrization was completed on the 52nd day. The patient could already walk with a wooden leg, when he caught the hospital fever, which was epidemic at Ulm, where he awaited his regiment, and, to my great regret, he was carried off by this disease, after having escaped the former danger.

"After the battles of Austerlitz and Jena, (continues M. Larrey) several of my colleagues, surgeons of the first class, undertook, in consequence of my advice, and the examples of success, which I had recited to them, the amputation of limbs equally sphacelated, although the mortification was not limited, rather than abandon the patients to a death, which appeared inevitable. In general, these practitioners experienced the same success, as I did myself." (*Larrey, in Mém. de Chirurgie Militaire, Tom.* 3, *p.* 154—157.)

In M. Larrey's memoir upon this subject, there are some additional facts and arguments in favour of what he endeavours to prove, viz. that, in cases of mortification from external injuries, if the patient's life is in danger, amputation ought to be performed, although the sloughing may yet be in a spreading state. I must be content, however, with having stated

the particulars already explained; and the reader, desirous of more, must refer to M. Larrey's own publication. Certainly, the facts, which this gentleman has adduced, are highly important: they tend to subvert a doctrine, and to prove the error of a practice, which have been urged in most forcible terms by all the distinguished surgeons of modern time. The sentiments of Mr. Sharp are rendered questionable; and the truth of the positive assertions of Mr. Pott is yet a matter to be examined. The latter, it is well known, tells us, that he has often seen the experiment made of amputating, while a mortification was spreading, but never knew it answer. Are we to conclude, that all these cases, which Pott alludes to, were mortifications from an internal cause? Or, are we to suppose that the operations failed from having been delayed too long? Or, must we imagine, that the nature of the human constitution has been changed between the æra of Mr. Pott and that of M. Larrey? The last gentleman's facts are too well authenticated to admit of being disbelieved.

4. *Application of Caustic Substances, and of the Actual Cautery.*

Having explained the chief indications in the treatment of mortification, we proceed to notice some particular means, which have been recommended by practitioners of eminence, as being in certain cases very efficacious. We allude to some caustic substances, and even the actual cautery, which have sometimes been successfully employed in this disease.

One of these applications is the muriatic acid, more or less diluted with water. It was Van Swieten, who particularly recommended this remedy; he mixed the acid with six times its quantity of water, and applied it as a fomentation to the mortified part, after making deep scarifications. In this manner he stopped, or seemed to stop, a mortification, arising from a violent inflammation of the scrotum and penis, and which extended all over these parts. The same author strongly recommends this same topical application to the sloughy state of the gums in cases of scurvy. In this kind of case, he mixed the muriatic acid with honey, in various proportions; sometimes, he even employed the pure acid itself for touching the parts, which were likely to slough. It is easy to comprehend, that the muriatic acid, as well as other mineral acids, and vinegar, weakened with a sufficient quantity of water, may act as an antiphlogistic, and antiseptic, but, when it is concentrated, its manner of acting is then very different, as it is a real caustic, and its salutary effects can only be explained by the change, which it produces in the nature of the inflammation, which now becomes favourable to the formation of healthy pus.

It is only in the same way, that we can account for the good effects, attributed to another, much more active caustic, than the muriatic acid, namely, a solution of mercury in the nitrous acid, with which solution the edges of the mortified part are recommended to be wet. This, it is said, stops the progress of mortification. We are not, however, possessed of a sufficient number of facts in support of such practice. An example, however, mentioned by a judicious author, Mr. Kirkland, deserves attention.

A man met with a fracture of the forearm, and the ends of the bones projected through the integuments. The fracture was very expeditiously reduced; but, at the end of five, or six days, the whole arm seemed to be completely mortified up to the shoulder. Amputation was performed as near the joint as possible, and the stump, which had mortified as far as the acromion, was cauterised. The following day the mortification had reached the inferior extremity of the scapula. A little of the solution of mercury in nitrous acid was now applied, by means of a probe, along the edges of the parts affected, and from this moment the disorder made no further progress. This cauterisation was repeated every day, for seventeen, or eighteen days. The sloughs, and, especially, the scapula, were detached, and the patient got well.

With respect to the actual cautery, Celsus has recommended it to be applied to the line, which separates the dead parts from those which are still living, whenever medicines, and, particularly, topical emollient applications fail in stopping the progress of the disorder. M. Pouteau has ventured to revive this practice, which had been entirely exploded from modern surgery, and he was of opinion, that the method might have the most beneficial effects, in cases of erysipelatous gangrene, which is so often seen in hospitals, in consequence of wounds. For this purpose, he recommends cauterising chiefly the edges of such parts, as are of a dark red colour, and are on the point of perishing; and he advises this to be done with a heated iron, or boiling oil, and to repeat the cauterisation of the dead parts, at every time of dressing them, until the sensation of heat is even felt with a certain degree of force in the sound parts. The whole of the affected part is afterwards to be covered with a large emollient poultice.

M. Pouteau relates a very interesting

case of an anthrax, which took place on a woman's cheek, and which he cured in the above manner. The tumour, which, on the third day, was quite black, and as large as a walnut, was accompanied with an erysipelatous œdema, which extended over the whole cheek, eyelids, and front of the neck. M. Pouteau, after having opened the tumour in different directions with a lancet, introduced the red-hot cautery, and repeated the application several times, until the heat was felt by the sound flesh. The patient felt herself very much relieved immediately after this had been done; an oppressive headach, and a very afflicting sense of strangulation, which she before experienced, were got rid of, and, in ten days more, the slough was detached by the occurrence of suppuration. (*Encyclopédie Méthodique, Partie Chirurgicale, Art. Gangrene.*)

The foregoing observations are introduced into this work, that the reader may not be left entirely ignorant of what violent measures the old surgeons adopted in cases of mortification, and the account is not given, in order that such practice may be again imitated. The employment of such terrible applications, as the actual cautery, and boiling oils, is as unscientific, and unnecessarily painful, as it is unproductive of any essential good. The grand object in almost every case of mortification, is to diminish the irritation of the parts in immediate contact with those already dead. This is indicated, lest the parts still alive, and so situated, should experience the same fate, as the contiguous ones. Some who have reprobated the application of spirituous, and resinous substances to parts affected with mortification, and who have also condemned incisions and scarifications, give their approbation to the use of the cautery. They assert, that the manner, in which the latter acts, is essentially different from that, in which spirituous and resinous applications operate, and that while these, by irritating the affected parts, tend to increase and propagate the inflammation, that leads to mortification, the lively action of the cautery changes the nature of such inflammation, and establishes that state of the vessels, which is necessary for a favourable suppuration. They state, also, that the cautery gives a tone to the vessels, in the vicinity of the parts to which it is applied, and, in proof of this remark, they refer to the effects of the application on different ill-conditioned ulcers, and particularly, on carious bones. (*Encyclopédie Méthodique, Partie Chirurgicale, Art. Gangrene.*)

Notwithstanding these assertions, I shall venture to congratulate the surgeons of this country in particular, on the total rejection of the use of the actual cautery and boiling oils, in cases of mortification.

Consult *B. Bell's System of Surgery. Encyclopédie Méthodique, Partie Chirurgicale, Art. Gangrene. Kirkland on Gangrene, and on the Present State of Medical Surgery. Richter's Anfangsgr. der Wundarzneykunst, Band.* 1, *Kap.* 3. *Various parts of Hunter on Inflammation, &c. Sharp's Critical Enquiry into the Present State of Surgery, Chap.* 8. *Richerand's Nosographie Chirurgicale, Tom.* 1, *p.* 131, *&c. Edit.* 2. *Lassus, Pathologie Chirurgicale, Tom.* 1, *p.* 30, *&c. Edit.* 1809. *Levéillé, Nouvelle Doctrine Chirurgicale, Tom.* 4, *p.* 321, *&c. Paris* 1812. *Larrey, Mémoires de Chirurgie Militaire, Tom.* 3, *particularly, the Mém. sur la Gangrène de Congélation, p.* 60, *and that sur la Gangrène Traumatique, p.* 141.

MOXA (Japanese). A soft lanuginous substance prepared from the young leaves of a species of mugwort. It is used in the following way: A little cone of the moxa is laid upon the part, previously moistened, and set on fire at the top. It burns down with a temperate glowing heat, and produces a dark-coloured spot, the exulceration of which is promoted by applying a little garlic. The ulcer is left to discharge, or is healed up according to the object in view. The moxa is famous in the East for curing several diseases; and the French are in the habit of using it; but, whenever English surgeons wish to produce a slough, they have recourse to caustics, in preference to actual fire.

MUNDIFICATIVES. (from *mundifico*, to cleanse.) Applications, which make sores put on a cleaner appearance.

MYDRI'ASIS. (from μύδαω, to abound in moisture.) A preternatural dilatation of the pupil; so named, because it was thought to originate in redundant moisture, or too great an influx of humours. It is often a symptom of an amaurosis.

MYO'PIA. (from μύω, to wink, and ὤψ, the eye.) That kind of short-sightedness, in which the eyes are half shut, and always winking.

N.

NÆVUS. A mole, or freckle on the skin. *Nævi materni* signify the little spots, excrescences, or swellings, with which many children are born. There are two kinds, viz. small red tumours, which gradually increase to a large size; or brown flat marks, not rising in the least above the surface of the skin. Mr. Latta says, he once saw in a child two years old, a tumour of this kind weighing fourteen ounces, which, at the time of birth, was only equal in size to a large bean, and which for a year afterwards, did not enlarge much; but, then grew to the magnitude already specified. The other species of nævi materni, or such as rise but little above the skin, are of various forms, and have been compared with cherries, grapes, &c. and have all been supposed to arise from some impression made on the mind of the mother during pregnancy, or at the time of conception. The settlement of this disputed point, I shall leave to speculative writers.

Those nævi materni, which are mere spots, or marks, give no inconvenience, and of course do not require the interference of surgery. But such nævi materni as elevate themselves above the surface of the body, increase in size, and seem likely to become troublesome, should be entirely removed with a knife. Many of them seem to consist of a congeries of dilated vessels, and, after they have acquired a certain size, are apt to burst and bleed profusely. John Bell has named this kind of disease *aneurism by anastomosis*; the description, and proper treatment of which are to be found in the article *Aneurism*.

Mr. Abernethy cured an extensive nævus maternus, of a child's arm, with a bandage. (See *Latta's System of Surgery, Vol. 2, Chap. 22. John Bell on Aneurism by Anastomosis, in his Principles of Surgery, Vol. 1. Abernethy's Surg. Observations.*)

NATRON PRÆPARATUM, in surgery, is chiefly given in cases of bronchocele, and scrophula. The common dose is a scruple.

NEBULA. (from νεφελη, a little cloud.) A cloudiness of the cornea of the eye. See *Cornea, Opacity of*.

NECROSIS. (from νεκροω, to destroy.) This word, the strict meaning of which is only mortification, is, by the general consent of surgeons, confined to this affection of the bones. The death of parts of bones was not distinguished from caries by the ancients. However, necrosis and caries are essentially different; for, in the first, the affected part of the bone is deprived of the vital principle; but this is not the case when it is simply carious. Caries is very analogous to ulceration, while necrosis is exactly similar to mortification, of the soft parts.

The subject of necrosis is a peculiarly interesting one; for, it introduces us to a knowledge of reparations accomplished by nature, which would excite admiration and wonder even in men whose feelings are the most thoroughly chilled with apathy. What man, unacquainted with the facts, which the rich records of surgery now present, would ever suppose, that so large a bone as that of the thigh might perish, a new one be afterwards generated, and the old dead one in time removed by absorption, so as to leave the functions and power of the limb quite unimpaired? —We shall first explain the most remarkable circumstances, relative to the nature of necrosis, next mention a few important cases, and lastly speak of the treatment.

It is a remarkable circumstance, in the history of necrosis, that, in favourable instances of the disease, the inflexibility and firmness of the limb are preserved, during the whole of the process, by which the new bone is formed. Consequently, the new bone must have begun to grow, and must have acquired firmness before the old bone separates, or is absorbed. Were this not the case, the limb must become flexible and useless, the moment the dead bone is removed. Another consequence of the new bone being formed, before the removal of the old one, is that the former must surround and include the latter. For, since the lifeless portion of bone completely occupies the space between the two living ends, these cannot be immediately connected by the new bony matter. The connexion can alone be completed by the new bone being deposited on the outside of the old one, from one end to the other, and attaching itself to the portions which still remain alive. The new bone must also be necessarily larger, than the old one, because externally situated, and hence the affected limb, after the cure is complete, will always continue larger, clumsier, and less shapely than the other. The length of it, however, remains unaltered, because the old bone retains its attachment, while the rudiments of the new bone are lying on its outside, and connect the living ends of the old one, by an inflexible mass, equal in length to the portion, which is destroyed.

Thus we see, that, in the process, which

nature follows in the formation of the new osseous shell, the old bone serves as a mould for the new one; and the first step of the process is to surround the old bone with an effusion of coagulating lymph. (*Russell on Necrosis, p.* 2—7.)

This author adduces many arguments to prove, that the pulpy mass, which extends from one portion of the bone to the other, and is itself at last converted into bone, is formed quite independently of the original bone, or the periosteum. (*P.* 27.)

On the other hand, Mr. Crowther has published a letter, written by Mr. Macartney, in which the periosteum is described, as being the organ producing the new bony matter. Mr. Macartney remarks, "that the first and most important circumstance is the change, which takes place in the organization of the periosteum; this membrane acquires the highest degree of vascularity, becomes considerably thickened, soft, spongy, and loosely adherent to the bone. The cellular substance, also, which is immediately connected with the periosteum, suffers a similar alteration: it puts on the appearance of being inflamed, its vessels enlarge, lymph is shed into its interstices, and it becomes consolidated with the periosteum. These changes are preparatory to the absorption of the old bone, and the secretion of new osseous matter, and even previous to the death of the bone, which is to be removed. In one instance, I found the periosteum vascular and pulpy, when the only affection was a small abscess of the medulla, the bone still retaining its connexion with the neighbouring parts, as it readily received injection. The newly organized periosteum, &c. separates entirely from the bone, after which it begins to remove the latter by absorption;" and, while this is going on, its inner surface becomes covered with little eminences, resembling granulations. "In proportion as the old bone is removed, new osseous matter is dispersed in the substance of the granulations, whilst they continue to grow upon the old bone, until the whole, or a part of it, is completely absorbed, according to the circumstances of the case. What remains of the investment, after the absorption of the old bone, and the formation of the osseous tube, which is to replace it, degenerates, loses its vascularity, and appears like a lacerated membrane. I have never had an opportunity of examining a limb, a sufficient time after the termination of the disease, to ascertain, whether the investment be at last totally absorbed, but, in some instances, I have seen very little remaining. During the progress of the disease, the thickened cellular substance, which surrounded the original periosteum, becomes gradually thinner; its vessels diminish, and it adheres yeltirts to the new-formed bone, to which it ultimately serves as a periosteum." Mr. Macartney states, that the anatomical preparations, which authenticate the above observations, are preserved at St. Bartholomew's Hospital. (See *Crowther on White Swelling, p.* 183, *Edit.* 2.)

With respect to the symptoms of necrosis, an incipient case is characterised by a deep seated excruciating pain, not at first aggravated by pressure, and which is soon followed by a rapid enlargement of the parts along the course of the bone. Soon, however, after the commencement of the attack, an external inflammation succeeds, which quickly ends in the formation of matter. The abscess, at length, bursts by a small opening. The extent of this inflammation is not in general great. Most commonly several inflammations, of a circumscribed kind, occur about the same time, the abscesses burst by small openings, which do not close, but continue discharging matter, as fistulous sores. The apertures are generally situated over the most superficial part of the affected bone. The pus is usually of good quality, and large in quantity, issuing from extensive cavities, into which the fistulæ lead. Such abscesses, being situated within the newly formed osseous shell, cannot be discharged by pressure, nor can any fluctuation be felt. A probe can seldom be introduced far into the fistulous openings, or discover any loose piece of bone. In this stage, the dead bone, technically called the *sequestrum*, can seldom be felt, though, in a few instances, small spiculæ make their way outward, together with the discharge. Fistulous openings may be regarded, as necessarily attendant on all cases of necrosis; though so mild a case may be conceived, that the new bone may be generated without any outward ulcerations. No such instance, however, is on record. (*Russell.*)

After the openings have formed, the case may take one of the following courses. The ulcerations may in time heal up, the sequestrum never be seen, and no vestige of the disease remain, except a permanent enlargement and induration along the course of the bone. This is the most favourable manner, in which a necrosis may terminate. In the other one, the sequestrum makes its appearance externally, through the new bone and the integuments, attended with different degrees of pain, inflammation, and suppuration, in different cases. The sequestrum may at first be moved by shaking it; but, is too firmly wedged in the surrounding parts to be completely taken out. In time, however, it becomes loose enough to be removed.

Sometimes, the middle portion of the sequestrum presents itself externally, while its sides are every where wedged in the substance of the new bone. The natural end of such a case would be very tedious of accomplishment, and the interference of art is essentially serviceable in accelerating the separation of the dead bone, thus circumstanced. After the sequestrum has been either absorbed, or thrown off, in one of the above ways, the cavity of the new bone becomes filled up with granulations, which are, at length, converted into bony matter. Thus the new bone differs from the original one, in being solid, instead of hollow. (*Russell.*)

When the sequestrum is thrown off slowly, the inflammation is moderate; but, when it separates quickly, while the new bone is in a soft state, the detachment is always preceded by severe inflammatory symptoms, and followed by a temporary loss of the natural firmness of the limb. This premature separation of the sequestrum often occurs in necrosis of the lower jaw, and the chin consequently falls down on the neck. In certain cases, the sequestrum separates at each end from the living portions of the old bone, before the new osseous shell has acquired firmness, so that the limb feels as if it were broken in two places. (*Russell.*)

When the dead bone is removed by absorption, the process is tedious, and attended with a profuse discharge of matter, which gradually ceases, and at last stops altogether. In young subjects, this work is more quickly perfected, than in old ones. There are some chronic cases of necrosis, in which the sequestrum remains unabsorbed, for an indefinite length of time, producing no violent irritation, yet, always enough to teaze the patient, and disturb his health.

In necrosis of the long bones, there are always round apertures in the new osseous shell, corresponding with the external fistulous openings, as long as the sequestrum remains enclosed in it. (*Russell.*)

The tibia, femur, lower jaw, clavicle, humerus, fibula, radius, and ulna, are most frequently affected with necrosis. Excepting the lower jaw and scapula, the process of regeneration has only been noticed, in the cylindrical bones. From twelve to eighteen years of age, is the time of life, most subject to necrosis. The necrosis of the lower jaw, however, seldom occurs before the age of thirty. In some persons, two bones are affected at once, owing to constitutional causes.

The process of cure is said to take place with more celerity in the lower jaw, than any other bone, and may be completed in three months. Mr. Russell has never known a necrosis of the tibia get well in less than a year; but, in general, nearly two years elapse first; sometimes, the cure is protracted to a much greater length of time.

When the constitution is predisposed to necrosis, any cause, capable of exciting inflammation, may occasion an attack of it. Often, however, the disease is purely sporadical, and not referrible to outward causes. Cases, which occur from external injury, are generally those of the lower jaw, which are frequently imputed to blows, the application of acrid substances to carious teeth, effects of mercury, &c.

Necrosis of the lower jaw and clavicle never proves fatal: that of the lower extremities, which is the worst case, does so very seldom, and only, from the violence of the first inflammatory symptoms, which rapidly bring on a hectic fever, which proves incurable, without removing its local cause by a timely amputation. When the violence of the first stage, however, has abated, the irritation ceases, and the hectic symptoms, if there are any, are generally moderate. Nor is this state of tranquillity disturbed, till the sequestrum, in making its way outward, again produces irritation. At this second period of urgency, extensive inflammation may originate, ulcerations spread all over the surface of the limb, assume an unhealthy appearance, violent fever succeed, and the patient either perish, or sink into a state, in which he must consent to amputation, as the only means of saving his life. This is the last crisis of eminent danger; but, in general it is less perilous, than when the inflammation comes on in the incipient stage of necrosis. (*Russell.*)

The following case of necrosis of the thigh-bone is related by Dr. Mackenzie. —William Baxter, a boy thirteen years old, received a blow on his thigh at school, of which he at first hardly complained; but, in a few months, he began to have pain in the thigh, which inflamed, swelled, and appeared to have matter in it. The parents being poor, no surgeon was called, and the boy was allowed to linger for a great while. At length, the matter made its way through the skin, by a small opening, on the interior part of the thigh, about three inches above the knee, and a thin sanies continued to be discharged for eighteen, or twenty months. At length, the hole in the skin enlarged, and the point of a bone began to protrude, and give a good deal of pain, when the clothes rubbed against it. After suffering in this manner for two years and a half, the boy, as he lay in bed one morning, felt the bone looser, and projecting more, than ordinary. He gave it a strong pull, and brought the piece away entirely, which proved to be seven inches and a

half of the thigh-bone. A good deal of bleeding followed; but, the wound soon healed, and he has never since found the least inconvenience. Dr. Mackenzie, hearing of this singular case, sent for the boy, carefully examined his thigh, and found it as firm as the other. The only difference was, that it was somewhat thicker, and a little more curved. The muscles retained their natural softness, and looseness on the bone. The detached piece of bone was a portion of its whole circumference.

In confirmation of this case, Dr. Hunter mentions a tibia, which was sent to him by a Mr. Inett, after amputation. On examination, the case at first sight seemed to be a swelling of the whole bone, with a loose internal exfoliation. However, it proved to be a remarkable instance of the separation of the greatest part of the original bone whose place was supplied by a callus. The external surface of the inclosed loose piece of bone was smooth. A small part of the surrounding bony substance being removed, the contained piece wa taken out, and found to be the whole body of the tibia. It had separated from the epiphysis at each extremity. The middle part of the bone had perished, consequently, had lost its connexion with the periosteum, and was gradually thrown off from the living parts of the bone at each end. A callus extended from end to end, united the two extremities of the original tibia, preserved the length, and gave firmness and inflexibility to the part. The exfoliation was so encompassed by the new bony case, that, though quite loose, it could not be thrown out. (*Med. Obs. and Enquiries, vol.* 2.) In the 5th vol. of the *Mem. de l'Acad. de Chirurg.* is the history of a man, the whole of whose clavicle came away, without his being deprived of any of the motions of the arm. The death of this patient, which happened shortly afterwards, afforded an opportunity of examining how nature had repaired the loss. Another clavicle was found regenerated, which neither differed from the original one in length, or solidity; but, only in shape, being flatter, and not so round. It was connected with the acromion and sternum, just like the primitive bone.

Though necrosis mostly attacks the cylindrical bones, the flat ones are not exempt from the disease. Pott makes mention of a parietal bone, the whole of which was detached, and of an os frontis, the greatest part of which came away. In a thesis on necrosis, in 1776, *aux écoles de chirurgie*, may be found the case of a young man, a very large part of whose scapula perished and came away. Chopart, who relates the case, mentions, that he saw the patient quite recovered, and felt a new triangular moveable bone, firmly supporting the clavicle, but, smaller and flatter, than natural, and without any spinous process. The same has happened to the lower jaw, as may be seen by referring to the *Ephemerides Germaniæ*, and *Mem. de l'Acad. de Chirurgie.* In the fifth vol. of the latter work, is an account of a woman, who applied to be relieved of some venereal complaints. From the beginning of the treatment, the bone was discovered to be loose just under the gums, and seemed, shortly afterwards, to move backwards and forwards with a tooth. M. Guernery took hold of the tooth with a key-instrument, and found it firmly inserted in the moveable piece of the jaw; he made with caution the necessary manœuvres for extracting the portion of bone; but was greatly surprised on finding what an extensive part yielded to his very moderate efforts. It was the whole of the lower jaw, above its right angle, from its division into the coronoid and condyloid processes to the space between the first and second of the front grinders of the left side. On the right, there only remained the condyle in the articular cavity of the temporal bone. This destruction left a considerable empty space, from which great deformity was apprehended, in consequence of the unsupported soft parts falling down. The woman, however, got well in two months, and had the most perfect use of a new jaw. A similar fact is recorded in the *Journal de Medecine*, 1791.

In cases of necrosis, the surgical indications are few and obvious; viz. 1. When inflammation attends any stage of the disease, to have recourse to common antiphlogistic means;—2. To promote the separation, or absorption, of the dead bone, according as it tends to make its way outward, or to become completely incased with new bony matter; and, in this situation, to be invisibly and gradually removed by a natural process. 3. When the constitution seems unable to sustain any longer the effects of the local disease, to amputate, if the situation of the affection will permit.

During the first inflammatory attack, the patient's life is often endangered from the extent and violence of the inflammation, before the new shell is formed, or the sequestra loose, and ready to separate. In this state, art can do little more, than employ topical bleeding, and fomentations, and poultices. If, notwithstanding such treatment, the patient should seem likely to perish of the hectic symptoms, which rapidly follow, unless the limb be immediately removed, the operation should then not be delayed.

But, if the patient get over the first in-

flammatory stage, the grand object is to get rid of the sequestra. When they, however, are undergoing a gradual absorption, without ever making their appearance externally, or giving any considerable disturbance to the constitution; or, when the dead bone is making its way outward, without occasioning urgent inconveniences; the surgeon should interfere very little with the natural progress of the case. When the dead bone does not tend to make its way through the skin, but lies quietly incased in the new osseous shell, the occurrence of extensive suppurations may be prevented, by occasionally applying leeches, and keeping open a blister with the savine cerate, as recommended by Mr. Abernethy in his lectures, and Mr. Crowther, in his work on the White Swelling. The blister will, at the same time, have great effect in promoting the absorption of the sequestrum, and, of course, in accelerating the process of cure.

When the dead bone, however, creates considerable irritation, when its middle portion is very superficial, or quite exposed, while its ends, or edges, are overlapped by the surrounding new bony matter, consequently the piece so wedged in, that its separation cannot be expected in any moderate time, the operation of cutting it out, is, certainly, not only feasible, but highly proper and commendable. In this kind of case, Mr. Hey's saws would be found the most convenient instruments.

Also, were the dead bone, though quite covered and incased in the new one, to be tediously long in being absorbed, productive of great irritation and impairment of the health, and the affected bone superficial, like the tibia, no candid man could condemn making an incision, and removing a part of the osseous shell, in order to take the chance of being able at once to extract the sequestrum lodged in its cavity. Mr. Russell mentions successful attempts of this kind, which fully justify the practice. The state of the bone may be examined, without proceeding to any severe operation, by laying bare small portions of the bone in the vicinity of the fistulous openings, introducing a probe, if possible; or, if that be impracticable, drilling small holes with a perforator, for the purpose of exploring the state of the cavity. If the cavity should still seem extensive, and to contain a sequestrum of considerable size, the necessity of operating is apparent. On the contrary, if the whole cavity be filled up with osseous matter, and no dead bone be found there, the progress of the case must, of course, be left to nature. (*Russell.*) When the surgeon knows, that this object is to make an opening large enough to allow the dead piece to be extracted, he scarcely needs directions how to set about making it. The skin must be divided with a common scalpel, and the bone cut with small trephines, a gouge and mallet, or what are in most cases best, Mr. Hey's saws.

Consult *Russell on Necrosis*, 1794. *Mem. de l' Acad. de Chirurgie, tom. 5. Boyer on the Diseases of the Bones, Vol.* 1. *Encyclopédie Méthodique; Partie Chirurgicale; Art. Necrosis. Thesis de Ossium Necrosi*, 1776. *Crowther on White Swelling, &c. Edit.* 2. *By far the most valuable work on necrosis is, I believe, Weidman de Necrosi Ossium, Francofurti*, 1793. *See also M. David's Obs. sur une maladie connue sous le nom de necrose; Paris* 1782. *Bonn's Thesaurus Ossium Morbos. Richerand's Nosographie Chirurgicale, Tome* 3, *p.* 138, *Edit.* 2. *Levéillé, in Nouvelle Doctrine Chirurgicale, Tom.* 4, *p.* 321, *&c. Paris*, 1812. *Larrey, in Mém. de Chirurgie Militaire, Tom.* 3, *p.* 367.

NEPHELA. (dim. of νεφος, a cloud.) A cloud-like spot on the cornea.

NEPHRITIS. (from νεφρος, a kidney.) Inflammation of the kidneys.

NEPHROTOMY. (from νεφρος, a kidney; and τεμνω, to cut.) *Nephrotomia.* The operation of cutting a stone out of the kidney; a proceeding which, perhaps, has never been actually put into practice. In the *Abrégé Chronologique de l'Histoire de France par Mézerai*, and in the Philosophical Transactions for 1696, two cases of what is called nephrotomy are mentioned; but several circumstances in the accounts led Haller and others to conclude, that the operation alluded to in the first work, was nothing more than the high operation for the stone. With respect to the example in the latter work, the particulars are not detailed enough to shew that an incision was really made into the kidney. There is no doubt that stones have often been extracted from abscesses about the region of the kidneys, after their presence has been detected with a probe. But, with regard to cutting into the kidney, the deep situation of this viscus, and the want of symptoms, by which the lodgment of a stone in it can be certainly discovered, will always be strong objections to the practice. When a stone, from its size, cannot pass from the kidney, and excites inflammation and suppuration, no doubt, the surgeon may make an incision into the tumour, and extract the calculus. In this sense, nephrotomy is certainly a practicable operation. Warner contends, that it can only be practised in such circumstances, notwithstanding whatever may have been said by Marchetti, or others, upon the subject. In such a case, the operation would not be attended with any greater

difficulty, than the opening an abscess in any other part of the body. (See *Warner's Cases in Surgery*, p. 241, *Edit.* 4.)

NITROUS ACID. See *Acidum Nitrosum.*

NODE. *Nodus.* A swelling of a bone; a thickening of the periosteum, or a fascia; or a tumour on a tendon, from a venereal cause. See *Venereal Disease.*

NOLI ME TANGERE. By this expression, surgeons commonly imply an herpetic disease, affecting the skin and cartilages of the nose. Mr. Home says, that the ulcers, for which he has been led to employ arsenic, are named, from the virulence of their disposition, *noli me tangere*, and are very nearly allied to cancer; differing from it in not contaminating the neighbouring parts by absorption, but, only spreading by immediate contact. Ulcers of this kind differ exceedingly from one another in their degree of virulence; but, they are all so far of the same nature, that arsenic in general agrees with them, and puts a stop to their progress, while they are aggravated by milder dressings. (*Home on Ulcer, edit.* 2, *p.* 267.)

The disease generally commences with small, superficial, spreading ulcerations on the alæ of the nose, which become more or less concealed beneath the furfuraceous scabs. The whole nose is frequently destroyed by the progressive ravages of this peculiar disorder, which sometimes cannot be stopped or retarded by any treatment, external or internal.

The specific ulcerations do not generally extend to the parts far within the nostrils; but, at the time that I am writing this article, there is, under Mr. Harvey, in St. Bartholomew's Hospital, a curious example, in which the greatest part of the nose is destroyed, and the ulceration proceeds even through the front part of the palate into the mouth. The morbid process sometimes stops for a considerable time, and then is renewed with increased violence. The following case illustrates the nature of *noli me tangere*, and one mode of treatment, to which it yielded: Jane Chatillon, 45 years of age, was attacked, in the course of September, 1788, with an inflammation on the left ala of the nose. Some time afterwards the part ulcerated, which occasioned a troublesome and sometimes a painful itching: different means were unsuccessfully employed, and the case remained nearly in the same situation till the month of September in the following year. At this period, the ulcer spread very fast; the septum nasi, the muscles, and cartilages of both sides, were, in a short space of time, destroyed. The ulceration extended on the left side, on the loose edge of the upper-lip. This was the state of her case on her admission into the Hospital of St. Louis, in the month of October, 1789.

A poultice, moistened with aq. veg. was applied twice a day to the ulcer; a sudorific ptisan prescribed, and a pill, composed of one grain of calomel, and one grain of sulph. aurat. antimonii, ordered to be taken every day. From the fifth day, the inflammation lessened. No other sensible alteration took place till the 21st. The suppuration, that, till this time, had been black and putrid, now became white and inodorous.

On the 37th, the discharge was trifling, and the ulcer, being well deterged, was dressed with pledgets, dipped in a solution of verdegris and corrosive sublimate, in the proportion of six grains of each to a pint of water. On the 40th day, cicatrization began to take place, and was finished by the 60th.

Some time before it was completely cicatrized, an issue was made in the arm, which was healed up, without any inconvenience to the patient, six months after the cure. (*Parisian Chirurgical Journal, Vol.* 1.)

One of the best external applications to *noli me tangere* is the following lotion; ℞. Kali arsenicati, gr. iv. Aq. menthæ sativæ ℥iv. Spiritus vini tenuioris ℥j. Misce et cola. I have seen several cases in St. Bartholomew's Hospital, very lately, which were either cured or seemed disposed to get well with this application. The solution of arsenic, which Mr. Home has always used, is made by boiling white arsenic in water for several hours, in a sand-heat. When given internally, the dose is from three to ten drops; when for external application, a dram is to be diluted with ℔ij. of water; and this solution is gradually made stronger, as the parts become accustomed to it, till it is of double strength. However, this mode of using arsenic is by no means a well regulated one; and Plunket's caustic (see *Arsenic*) for outward employment, is not nearly so neat an application as the above-mentioned lotion. At St. Bartholomew's Hospital, arsenic is administered internally in the following formula: ℞. Kali arsenicati gr. ij. Aquæ menthæ sativæ ℥iv. Spiritûs vin. ten. ℥j. Misce et cola. Dosis ℥ij. ter quotidie. In this way, the quantity of arsenic is nicely determined. We shall only just add, with regard to this medicine, that, both as an external application and an inward remedy, in cases of *noli me tangere*, it perhaps deserves the highest rank. One scruple of the argentum nitratum, dissolved in half an ounce of distilled water, makes a very good application, which, although generally inferior, in point of efficacy, to arsenical ones, in the present

disease, occasionally does good, when nothing else seems to produce any benefit. The case above, makes us acquainted with another lotion, which deserves further trial. All fluid remedies must be applied to the part, by dipping little bits of lint in them, placing these on the ulcerations, and covering the whole with a pledget.

The ointments, which seem most likely to prove useful applications to *noli me tangere*, are the unguentum hydrargyri nitrati, the unguentum picis, and unguentum sulphuris. As far as my experience extends, they are generally less efficacious than lotions in the present cases; but, in particular instances, they prove superiorly useful, and, it deserves particular notice, that surgeons can often make no progress against this inveterate disease, unless they apply a different sort of dressing every day; sometimes, a lotion; at other times, an ointment. The little ulcers may occasionally be touched with the argentum nitratum. The small furfuraceous scabs, which are continually forming on the part affected, should be softened with a little of the unguentum spermatis ceti, and removed with as much tenderness as possible.

We have already remarked, that arsenic is a good medicine to be given as an internal medicine, and the best mode of exhibiting it is already explained. Another medicine, which is often useful in these cases, is what is known by the name of Plummer's pill, or the compound calomel pill. ℞. Calomelanos, Sulphuris Antimonii præcipitati, singulorum gr. xii. Guaiaci gummi resinæ, gr. xxiv. Saponis quod satis sit. Misce; fiant pilulæ duodecim. Dosis una bis quotidie.—In other instances, we may try the decoctum ulmi, or sarsaparillæ, with one of the following pills thrice a day: ℞. Calomelanos gr. vj. Succi spissati cicutæ ʒj. Misce; fiant pilulæ duodecim. The hydrargyrus sulphuratus has occasionally been given, as an alterative medicine, for the relief of *noli me tangere*; with what good effect I cannot pretend to say.

NYCTALOPIA. (from νυξ, night; and ωψ, the eye; or οπτω, to see.) An affection of the sight, in which the patient is blind in the day-light, but sees very well at night.

The Greek physicians are divided in their opinions concerning the now uncommon disease of nyctalopia. Hippocrates expressly says, "we call those nyctalopes who see by night." The author of *Defin. Medic.* "that they see nothing in the day-time, but have their sight by night." On the contrary, Paulus Ægineta, and Actuarius are as explicit in asserting, that they have their sight perfect in the day-time, but are blind by night. Aëtius is of the same mind, though he is thought to favour the contrary opinion, when he says, "they see better by night than in the day, and if the moon shines they are blind." The author of Isagoge embraces both opinions, when he says, "they, call those nyctalopes who, in the day-time, see more obscurely, at the setting of the sun more clearly, but, when it is night, much better; or, on the contrary, by day they see a little, but, in the evening, or at night, they are blind. Galen explains the word by a night-blindness. Pliny, Varro, Nonius, Festus, Celsus, and other Latin writers, give equally opposite definitions of the disorder. Dr. Pye questions, whether these two descriptions of nyctalopia, so diametrically opposite to each other, may not be reconciled by considering the disorder as an intermittent one. The difference then will only consist in the different times of the approach of the disease; that of Hippocrates came on in the morning; that of Ægineta, in the evening; both were expressly periodical, and the distance of time between the paroxysms, in both, was respectively the same; a whole day, or a whole night. The various shapes, in which intermittents appear, very much favour, says Dr. Pye, such an opinion; and the apparent success of bark in the case, which he has related, notwithstanding the unfavourable circumstances of the evacuations his patient laboured under, and the consequent necessity of its disuse, seem to confirm it in this gentleman's mind. (*Med. Obs. and Inq. Vol.* 1.)

If this opinion be true, we need only refer the reader to *Amaurosis* and *Hemeralopia*, for the best mode of treatment. But, certainly there are instances of nyctalopia, every now and then met with, in which the affection seems to depend on a peculiarity in the structure and organization of the eye; by reason of which, the quantity of light, which only suffices for vision in an eye of natural formation, proves too abundant for a nyctalops, and absolutely prevents him from seeing at all. We know, that in the eye there is a black substance, named the *pigmentum nigrum*; one supposed use of which is to absorb the redundant rays of light, which enter the pupil. A deficiency of this, may certainly account for a nyctalops being blinded with the day-light, and seeing best at night. On the whole, however, there can be no doubt, that amaurosis is occasionally a periodical disease, like an intermittent; and a species of nyctalopia may also be thus induced.

O.

ŒDEMA. (from οἰδέω, to swell.) The ancients understood, by this term, all kinds of tumours; but, it is now restricted to a swelling arising from an extravasation of an aqueous fluid in the cellular substance of a particular part; for, when the affection is more extensive, and especially when it is also accompanied with a general dropsical tendency, it then becomes a medical case, and receives the name of *anasarca*. An œdematous part is usually cold, and of a pale colour; and, as it is little, or not at all elastic, it pits, as surgeons express themselves, or, in other words, it retains for some time, the mark of the finger, after being handled, or pressed. Œdematous swellings are often connected with constitutional causes. In many cases, however, they seem to be entirely local affections, arising from such causes as only act upon the parts, in which the swelling is situated. Thus we observe, that after violent sprains of the wrist, or ankle-joint, the hands and feet often become œdematous; and limbs are frequently affected with œdema, in consequence of the return of blood through the veins being obstructed by the pressure of tumours on them, or that of splints, bandages, &c. Pregnant women are known to be particularly subject to œdema of the legs, owing to the pressure of the gravid uterus on the iliac veins. Persons who have been confined in bed, with fractured thighs, or legs, generally have more or less œdema of their feet and ankles, on first getting up again; and the affection, in these cases, is probably quite dependent on loss of tone in the vessels of the limb.

In the treatment of œdema, great attention must always be paid to the nature of the cause, in order to determine whether the disease originates from a mere local, or a general constitutional affection. When it depends on the pressure of a tumour on the veins, as we often see happen in cases of aneurisms, the effect cannot be got rid of till the cause is removed; and the aneurismal swelling must be lessened, before the œdematous one can admit of the same beneficial change. When œdema is the effect of vascular weakness in a limb, in consequence of sprains, contusions, &c. the best means of relief is, to support the parts affected with a laced stocking, or a flannel roller, while they are also to be rubbed with liniments, and bathed with cold spring water, till they have perfectly recovered their tone.

With regard to the œdema attendant on the advanced state of pregnancy, a complete cure cannot be expected till after delivery. The affection is generally more considerable in the afternoon, than the morning, owing to the different effects of an erect and a recumbent position. Some relief may be obtained by keeping as much as possible in a horizontal posture; and, when much inconvenience and pain are felt, the parts may be fomented with any aromatic and spirituous application.

Œdema is often one of the symptoms of suppuration; and, when the matter is very deeply situated, sometimes leads to its discovery. The truth of this remark is often seen in cases of empyema.

There is a species of œdema accompanied with a degree of heat, pain, &c. in the part, and which, in short, seems combined with phlegmon. In this case, saturnine lotions, the application of leeches, and the exhibition of saline purgatives, are proper. An erysipelatous œdema is also met with, in which the treatment should very much resemble what is explained in the article *Erisypelas*.

ŒSOPHAGOTOMY. (from *œsophagus*, and τεμνω, to cut.) *Œsophagótomia*. This operation consists in making an incision into the œsophagus, in order to take out of this tube foreign bodies, which lodge in it, and which can neither be extracted through the mouth, nor pushed down into the stomach, and whose continuance in the œsophagus would occasion fatal symptoms.

As the œsophagus is deeply situated, and covered by very important parts, such as the trachea, nerves, and considerable blood-vessels, every operation, the object of which is to make an opening into this tube, has always been regarded as exceedingly dangerous, and was even, for a long while, quite proscribed. However, although every rational practitioner agrees, that this proceeding should never be resorted to, without some most urgent cause, yet, if a case were to present itself, in which the œsophagus was so obstructed, by some extraneous substance, that no food could

absolutely pass into the stomach, or if, in consequence of an accident of the same nature, respiration were impeded in a manner imminently dangerous to life, doubtless the uncertain chance of the operation should be preferred to the certainty of a fatal event. Many instances of the œsophagus being accidentally wounded, have been known to end well. Mr. B. Bell saw a man, who, in attempting to kill himself, by cutting his throat, cut through a great part of the trachea into the œsophagus. Bohnius relates the case of a man, wounded in the same way, whose wound in the œsophagus was quite manifest, as every thing which the patient attempted to swallow came out of it. Both the patients, just mentioned, got well, and many similar examples are on record.

Guattani, a surgeon at Rome, published, in the third volume of the *Mem. de l'Acad. de Chirurgie*, a dissertation on the present subject. After explaining the manner of performing this operation, he relates some experiments made on dogs, which succeeded very well. He practised the plan also on the dead subject, in such a manner as to make it demonstrable, that the method was practicable on the human body. What is still more conclusive, the operation was actually done twice, on living subjects, with perfect success. The following is the account of these facts, as recorded in the *Mem. de l'Acad. de Chirurgie.*

"In the month of May, 1738, M. Goursauld, a surgeon at Coussat-Bouneval, in Limousin, was called to a man, who had swallowed a bone, an inch long, and six lines broad. M. Goursauld made various attempts to make this foreign body pass down into the stomach. Not being able to succeed, however, and the bone being felt on the left side, he determined to cut upon it, and try to extract it. An incision having been made, the bone was easily extracted, no bad symptoms followed, and the wound healed, with the aid of an uniting bandage. Care was taken to give the patient no food for six days, but to nourish him with glysters. A similar operation was performed, with equal success, by M. Rolland, surgeon-major of the regiment of Mailly." (*Memoires de l' Académie de Chirurgie, Tome* 3.)

Guattani, in this memoir, observes, with several other anatomists, that the œsophagus is always situated, not directly between the trachea and vertebræ, but rather more towards the left than the right. This fact would always lead a surgeon, when he deems œsophagotomy necessary, to undertake it on the left side of the neck. The parts, which cover the œsophagus, from the middle and external part of the neck, to the upper part of the sternum, are the skin, fat, cellular substance, muscles proceeding from the sternum to the larynx, the thyroid gland, the thyroid arteries and veins, the trachea, the recurrent nerve, &c. Things thus circumstanced, Guattani recommends the following mode of operating. "The patient is to sit on a chair, with his head inclined backward, as far as may be thought proper, and held by an assistant, so that it can neither move backward nor forward. The operator, placed before the patient, after pinching up the skin on the right side, into a transverse fold, with the fingers of his left hand, while an assistant does the same to that on the left, is to make, with a straight bistoury, a longitudinal incision in the integuments, from the upper part of the sternum. He is next to divide the cellular substance, fat, &c. which he will find between the left sterno-hyoideus, and sterno-thyroideus muscles, and the trachea. By means of two double blunt hooks, he is to keep the edges of the wound asunder, and, on dividing the cellular substance at the side of the trachea, with his finger and a few strokes of the knife, he will see the œsophagus. A longitudinal incision is then to be made into the lowest part of it, with a straight knife; and this wound must afterwards be dilated upward, with curved, blunt-pointed scissars. If any difficulty should be experienced, the surgeon may employ a director, to facilitate the last object. Small curved forceps, similar to those used for extracting polypi, are then to be introduced into the œsophagus, for the purpose of extracting the extraneous substance. This canal having been opened in the place above specified, the foreign body may be extracted with these forceps, whether it be situated above or below the aperture made for the purpose. This kind of opening will even be useful, when the extraneous substance has passed so far that it cannot be extracted with forceps; for, with a bougie, or some other instrument, it may now be easily pushed down into the stomach.

"The operation finished, the dressing of the wound is a point, which merits a great deal of attention, in regard to the method pursued to unite it. This object has always been accomplished, in the animals on which my experiments were made. If comparative surgery have any weight, it is certainly in such cases as the present one, in which the structure of the part seems to be almost the same. It is also proved by my experiments, that the œsophagus cicatrises very well, without contracting any adhesion to the adjacent parts. It is proper to observe, 1. That the integuments being cut, and the parts disengaged, if, by chance, the

vein, which brings back the blood from the inferior part of the thyroid gland, and runs into the left subclavian, should be cut, the hemorrhage may be stopped with a dossil of lint, which is to be compressed by an assistant's finger, during the operation. The vein will afterwards be compressed by the uniting bandage, employed for healing the wound; but, otherwise, a ligature is to be used. 2. That, on separating the lips of the wound, the recurrent nerve may be seen, at a greater or lesser distance from the trachea. If, then, it should be foreseen, that it would be injured in separating the cellular substance, and making the incision into the œsophagus, it must be drawn out of the way, with the same hook which is employed for pulling aside the left lip of the wound. In the same manner, the trachea may be carefully drawn to one side with the right hook, if it should embarrass the operator in finding out the œsophagus; a thing which may be done, without fear of seriously interrupting respiration. 3. That the œsophagus is to be opened, as near as possible to the trachea, especially at its upper part, where the arterial branch, which goes from the subclavian, to be distributed to the thyroid gland, sometimes runs. 4. That, if thought proper, the thyroid gland is to be separated from the left side of the trachea, when the foreign body, lodged in the œsophagus, requires a large incision, and, particularly, when this gland is very much swollen, as it would prevent a free view of the œsophagus. 5. That the œsophagus will be known to be opened, when the internal membrane, which is whitish, has been divided. 6. That the operation should be done with promptitude, when it is thought necessary, in order to avert the afflicting consequences of inflammation of the œsophagus. 7. That the operation being done, the reunion of the parts is to be promoted, by simple dressings, and the uniting bandage.

"With regard to regimen, besides all the general remedies required in such cases, and every thing which a judicious practice indicates, I am of opinion, that it would be proper (as far as possible) only to give the patient, at intervals, a little broth, for the first three or four days after the operation, so as not to disturb the healing of the parts. And, as broth might cause some little disturbance of the wound, even nourishing glysters, which we know, would suffice for the support of the patient this short time, who, in such cases, is not much reduced." (*Guattani, in Mem. de l'Acad. de Chirurgie, Tom.* 3.)

Whenever nourishment is to be conveyed into the stomach, through a wounded œsophagus, the hollow bougie should be introduced, from one of the nostrils, down the passage, and the liquid food injected through it, with a syringe.

ŒSOPHAGUS, FOREIGN BODIES IN. There are few situations, in which foreign bodies lodge more frequently, than in the œsophagus. The function of this tube explains the reason of this occurrence, and its great sensibility is a ground for the apprehension of many bad effects, which may result from the lodgment of extraneous substances in it.

Foreign bodies, liable to stick in the œsophagus, are not only food, such as pieces of crust, or meat imperfectly chewed, but also various substances which are accidentally swallowed alone, or with the food, such as little bones, stones, pins, pieces of money, &c. These latter things, by lodging in the pharynx, or œsophagus, may occasion very bad symptoms; and, if forced down into the stomach, may produce still worse effects. Hence, we should immediately try to extract them. For this purpose, the fingers are to be used, and if they cannot reach them, forceps must be employed. Some have recommended hooks, for the accomplishment of the object in view; others, various instruments, adapted to particular circumstances. The excitement of vomiting has been tried, and, occasionally with success; but, it is not free from danger, and the most distressing symptoms have been brought on by it.

When such extraneous substances cannot be extracted, they must be pushed down into the stomach, with some such instrument as a large bougie, or a whalebone probang, fifteen or sixteen inches long; and, on the end of which, a piece of fine sponge is firmly fastened. Small bits of sponge, tied on the ends of some string, have also been used; the patient is to swallow them, and then drink something. The sponge, expanded with the fluid, dilates the passage, and facilitates the descent of the extraneous substances into the stomach. But, when such bodies are, from their sharp-pointed, angular shape, or hurtful nature, likely to occasion perilous consequences, by being pushed down into the stomach, the plan must not be attempted. Hard, angular substances, and such things as pins and needles, which surgeons have not chosen, or not been able, to force down into the stomach, have often, after a time, made their way to the surface of the body, where an abscess has formed, out of which they have been discharged.

When hard bodies have been pushed, or have got of themselves, down into the alimentary canal, their ill effects should be counteracted, and their passage through

the bowels promoted by giving the patient frequent draughts containing the oleum amygdalarum.

When foreign bodies, in the œsophagus, resist the different means employed for their extraction, or for propelling them into the stomach, when such method has been judged to be proper; when, at the same time, the pain which they occasion, is not considerable; when they do not too seriously interrupt respiration, and leave sufficient room for the passage of aliment and drink; it is prudent to abstain from further attempts to displace them. They should be left to nature, while the practitioner should content himself with bleeding the patient a few times, exhibiting draughts containing the oleum amygdalarum, and employing glysters. But, when the lodgment of such foreign bodies dangerously obstructs respiration, by the pressure made on the larynx, an opening must be quickly made in the trachea, in order to serve for a time the office of the natural passage for the air. (See *Bronchotomy.*) As soon as the swelling subsides, another attempt may be made to move the extraneous substance. (See *L'Encyclopédie Méthod. Partie Chir. Art. Corps Étrangers.*)

There may be cases, in which death would certainly result from the continuance of a foreign body in the œsophagus, and as it could neither be extracted nor removed by common means, perhaps cutting into the œsophagus would be proper. (See *Œsophagotomy.*)

When some extraneous substances have been left to themselves, nature has sometimes succeeded in expelling them. They have excited a trivial suppuration, where they were lodged, by which they have been loosened, so as then either to be ejected by vomiting, or, after descending into the stomach, to be discharged by stool. In passing any instrument into the œsophagus, the great skill lies in putting it at once directly against the posterior part of the pharynx, so as to avoid touching the epiglottis, and keeping it closely against the vertebræ all the way down. The knowledge of this circumstance may be of infinite service in passing probangs, bougies, &c. but, hollow bougies are introduced in a different way, viz. through one of the nostrils, down the pharynx. When thus employed, they may sometimes be allowed to remain in the passage very advantageously. They are extremely useful for the conveyance of food and medicines into the stomach, when the œsophagus has been wounded; and as the elevation and depression of the larynx, in the action of swallowing, produces immense disturbance of wounds of the trachea, they promise to be of infinite service in the latter cases.

ŒSOPHAGUS, STRICTURES OF.

As the œsophagus is required to be wider at one time and narrower at another, in order to be fitted for conveying the different kinds of food into the stomach, it is nearly under the same circumstance with respect to the formation of stricture, as the urethra. Strictures in the œsophagus are, for very obvious reasons, much less frequent than in the urethra. However, they are by no means uncommon, and produce symptoms even much more distressing and dangerous, than those, which ordinarily arise from analogous obstructions in the passage for the urine.

This disease has been long noticed by surgical authors, and Mr. Warner in particular has recited an instance of it, that proved fatal, the patient having become incapable of taking nourishment. (See *Cases in Surgery, by J. Warner, F. R. S. p.* 130, *Edit.* 4.)

Of course, the most remarkable symptom of a stricture in the œsophagus, is the difficulty of swallowing, which must be greater or less, according as the obstruction is more or less complete. Sometimes no solid food whatever can pass down into the stomach, and fluids can only descend with great difficulty, and in very small quantities. This is, in some instances, attended with considerable pain, which extends along the fauces to the basis of the skull, and through the eustachian tube to the ear. The pain sometimes returns at intervals, and lasts a considerable time, even when no effort is made to swallow. If a bougie of proper size be introduced down the pharynx, it will often be stopped by the stricture just behind the thyroid, or cricoid cartilage; for, from Mr. Home's remarks, it appears that the obstruction is generally as high up as this situation. However, there are other cases, in which the obstruction is only of a spasmodic nature, and in such, a bougie may be passed quite down. It is curious, that strictures high up in the œsophagus, often occasion ulceration in this tube very low down towards the stomach, just as strictures in the urethra occasion ulceration in that passage towards the bladder. This is most apt to occur, when strictures of the œsophagus have been of long continuance, and may arise from the efforts in retching, which frequently comes on, and must strain the parts already deprived of their natural actions, and of the benefit of the secretions, with which they are lubricated in a healthy state. When such ulceration takes place, the characters of the original disease are lost; and when the ulceration extends upwards, the stricture itself may be destroyed. A bougie, introduced under such circumstances, will, in general, have

its point entangled in the ulcer; and when so skilfully directed as to go down into the œsophagus, it will meet with a difficulty while it is passing the commencement of the ulcerated part of the œsophagus, and another impediment where it leaves the ulcer, and enters the sound portion of the œsophagus below. These two resistances may lead to the supposition, that there are two strictures, while in fact there is not one, only ulceration as above described.

Strictures in the œsophagus are sometimes so complete, that swallowing even fluids is utterly prevented; the patient is obliged to have all nourishment injected *intra anum*, and in general soon perishes in a most emaciated condition.

Though any part of the œsophagus is liable to the kind of contractions forming strictures, the part immediately behind the cricoid cartilage, where the pharynx ends, and the œsophagus begins, is the most frequent seat of the obstruction. Those which are situated further down, do not so easily admit of being examined, and relieved by any surgical operation. Strictures of the œsophagus occupy very little extent of the passage, consist of a transverse fold of the internal membrane, and are attended with little thickening of the adjacent parts. These latter circumstances are such as render the disease capable of receiving relief either from simple or armed bougies.

There are two other diseases of the œsophagus, which have symptoms similar to those of strictures. One is a thickening of the coats of the œsophagus, which extends to the surrounding parts, and generally ends in a cancer, or an incurable disease. The other affection is an ulcer of the lining of the passage, commonly situated a little below the seat of the stricture, on the back part of the tube. In the early state, these diseases can only be distinguished from a stricture, by an examination with a bougie; afterwards their nature becomes clear enough from other symptoms which arise. Strictures also take place more commonly in young subjects; the other two diseases in the more advanced periods of life.

Mr. Home has found, that a bougie can be more easily introduced into the œsophagus, when the tongue is brought forwards out of the mouth. This gentleman remarks, that when a bougie is passed, with a view of learning the nature of the case, and it passes down to the distance of eight inches, measuring from the cutting edge of the front teeth in the upper jaw, its extremity has gone beyond the usual seat of stricture. If it be withdrawn without any resistance, the aperture in the œsophagus must then be larger than the bougie employed. But if the bougie stops at the distance of six inches and a half, or even lower, it must be retained there with a uniform pressure for half a minute, so as to receive on its point an impression of the surface by which it was opposed. If the end of the bougie retains its natural form, or nearly so, and there is an indentation on one side of it, or all round it, the surgeon may conclude there is a stricture. On the other hand, should the bougie descend without impediment, as far as seven inches and a half, and, when withdrawn, the surface of its point appear irregular and jagged, the disease is an ulcer on the posterior part of the œsophagus.

The mode of treatment adopted by Mr. Home, consists either in occasionally passing a common bougie through the stricture, and employing one of larger size, in proportion as the dilatation of the obstruction will allow: or else in introducing an armed one at convenient intervals. Consult *Practical Observations on the Treatment of Strictures in the Urethra and Œsophagus, Vol.* 1, *Edit.* 3, 1805. *Vol.* 2, 1808. *by E. Home, F. R. S.*

In spasmodic strictures of the œsophagus, blisters have been known to do good, and I have heard a most eminent surgeon express a strong expectation, that other strictures of this passage would be benefited, by feeding the patient through hollow bougies.

ŒSOPHAGUS, POLYPI OF. (See *Polypus.*)

OLEUM CAMPHORATUM. ℞. Olei Olivæ ℔j. Camphoræ ʒiv. Misce ut solvatur camphora.

Some practitioners employ this for promoting the suppuration of indolent, particularly scrophulous swellings, which are to be rubbed with the application once, twice, or thrice a day, according to circumstances.

OLEUM LINI. In surgery, linseed oil is often used as an application to burns, either alone or mixed with an equal quantity of the aqua calcis. It has also been applied to cancerous ulcers, as some assert, with considerable benefit.

OLEUM ORIGANI. The oil of marjoram is often used by surgeons for discussing ganglions: the tumours are to be rubbed with it two or three times a-day.

OLEUM PALMÆ CAMPHORATUM. ℞. Camphoræ ʒij. Olei palmæ ℔j. The camphor is to be reduced to powder, and the palm oil, being melted, and suffered to become almost cold, is to be mixed with it in a mortar. This application is a mild topical stimulant: it has been used for promoting indolent suppurations, especially those of a scrophulous nature, which take place under the jaw, and are attended with a good deal of chronic induration at their circumference.

OLEUM RICINI. In such surgical cases as require the bowels to be opened with the slightest degree of irritation possible, the oleum ricini is the best and safest medicine that can be given. The usual dose is one large table-spoonful, which must be repeated every two or three hours, till the desired effect is produced.

OLEUM TEREBINTHINÆ. Oil of turpentine is employed externally as a stimulating liniment, and a styptic. In the article *Liniment* may be seen some formulæ, in which turpentine is the most active ingredient. It is sometimes exhibited by surgeons internally, for the cure of gleets.

OLEUM TEREBINTHINATUM. ℞. Olei Amygdalæ ℥ss. Olei Terebinthinæ gutt. xl. Misce.

In deafness, occasioned by defective, or diseased actions of the glandulæ ceruminæ, Mr. Maule directs a little of this oil to be dropped into the patient's ear, or applied at the end of a small dossil of cotton.

When a thin secretion takes place, the cure is also promoted by a small blister, which he orders to be placed as near the ear as convenient, and kept open by the common means. Of course, the savine cerate would now be preferred for this purpose. The meatus auditorius externus must also be cleansed every day with a lengthened bit of soft cotton, affixed to a probe. This is to be introduced into the passage, and twisted gently round, so as to wipe away the discharge. (See *Pharmacop. Chirurgica.*)

OMPHALOCE'LE. (from ομφαλος, the navel, and κηλη, a rupture.) A rupture, or hernia at the navel. See *Hernia.*

ONYCHIA. (from ονυξ, the nail.) An abscess near the nail of the finger. See *Whitlow.*

O'NYX. (from ονυξ, the nail.) A small collection of matter, situated under the cornea, in the anterior chamber of the aqueous humour, and so named from its being shaped like a nail. It is of the same nature as *Hypopium*, to which word I must refer the reader. Maître-Jean, Mauchart, and several other oculists, imply, however, by the term *onyx*, a small abscess between the layers of the cornea.

OPHTHALMY. (from οφθαλμος, the eye.) *Ophthalmia.* Inflammation of the eye.

Ophthalmy is not only a consequence of several affections of the eye and adjacent parts, on the existence of which its continuance entirely depends; it is frequently, also, the primary complaint, and too frequently the fore-runner, of those irreparable diseases which deprive the patient of vision. Redness of the tunica conjunctiva; tumefaction of the eyelids; aversion to light; lancinating pain in the orbit; an itching, conjoined with a sensation of heat; and an uneasiness, seeming as if it arose from particles of sand in the eye; are symptoms forming the general inconveniences attendant on inflammations of the eye. No part of the eye-ball can be considered as exempt from the attack of inflammation. Hence, in ophthalmy, not only the conjunctiva, the sclerotica, and the choroides, but the retina itself, may also be inflamed, as well as the surrounding parts, the palpebræ, the muscles in the orbit, and the lachrymal gland.

The grand distinctions of ophthalmy are into two species, viz. *acute* and *chronic*; the one arising, as Scarpa says, from an excess of stimulus, and re-action of the living solid; the other connected with debility, which is generally limited to the vessels of the parts affected, but sometimes extends to the whole system. The Arabian authors termed the one *calida*, the other *frigida*. It should be well known, however, that every acute ophthalmy, though treated in the best possible manner, is never so completely resolved, but that beyond a certain period, at which all active disturbance ceases, there yet remains in the conjunctiva, or lining of the eyelids, a degree of chronic ophthalmy, either from local weakness in the vessels, or from a morbid irritability continuing in the eye, after the cure of the acute inflammatory stage. As it occasions a diseased secretion in the organ, and a slow accumulation of blood and coagulating lymph in the part, the inexperienced are apt to suppose, that the acute ophthalmy is not yet subdued, while it is completely so. Immediately the critical moment arrives, when the acute ophthalmy changes into the chronic one, attended with local weakness, it is highly important, in the treatment, to substitute for topical emollient, relaxing applications, such as partake of an astringent, corroborant quality. Those surgeons who now continue to employ the first remedies, only protract the turgescence of the vessels, and the redness of the conjunctiva. *Quo major autem fuit inflammationis vehementia* (says Richter), *eo major plerumque sequitur partium affectarum atonia, eoque major opus est adstringentium et roborantium longo usu, ut auferantur penitùs reliquiæ morbi, &c.* *Fascicul.* 1, *p.* 109, 110.

Mild acute ophthalmy is characterized by redness of the conjunctiva and lining of the eyelids, an unnatural sensation of heat in the eyes, uneasiness, itching and shooting pains, as if sand had got between the palpebræ and eye-ball. At the place where the pain seems most severe, some blood-vessels appear more prominent and turgid, than other vessels of the same

class. The patient of his own accord keeps the eyelids closed; for, he feels a weariness and restraint in opening them, and by this means, also, he moderates the action of the light, to which he cannot expose himself, without increasing the burning sensation, lancinating pain, and effusion of tears from the eye. If the constitution is irritable, the pulse will be a little accelerated, particularly towards the evening; the skin will be dry; slight shiverings will occur, and, in some instances, nausea, and inclination to vomit. (*Scarpa.*)

This complaint is often the consequence of a cold, in which the eyes, as well as the pituitary cavities, fauces, and trachea, are affected. It is not unfrequently occasioned by change of weather, sudden transitions from heat to cold, the prevalence of easterly winds, journeys through damp, unhealthy, sandy countries, in the hot season of the year, exposure of the eyes to the vivid rays of the sun, &c. Hence, it does not seem extraordinary, that it should often make its appearance as an epidemic, and afflict persons of every age and sex. Besides the preceding remote causes of ophthalmy, authors have enumerated the suppression of some habitual evacuation, such as bleedings from the nose, or piles, the menses, &c. affections of the primæ viæ, worms, dentition, &c. However, though persons thus circumstanced, are unquestionably subject to inflammation of the eyes, it may be doubted whether they are more so than other people, and when afflicted with ophthalmy, whether the alleged causes have any share in the origin of the latter complaint.

The mild acute ophthalmy is in general easily cured by means of low diet, gentle purging, with small repeated doses of the antimonium tartarizatum, and after making search for any extraneous body that may have insinuated itself beneath the eyelid, repeatedly washing the eye with a warm decoction of mallow leaves, and covering it with any very soft emollient poultice, included in appropriate little bags of exceedingly fine muslin. The fluid remedy may be most conveniently applied by means of an eye-glass. Scarpa orders the antimonium tartarizatum to be taken as follows: ℞. Antim. tart. gr. j. Decocti Hordei ℔iss. Crystall. tart. ʒj. Sacchari Purif. ʒvj. Misce. To be taken in divided doses every day. I have substituted the barley water for the decoction of dog-grass, which is certainly not essential.

With this treatment, the inflammatory stage of the mild acute ophthalmy, commonly ceases in the course of four or five days. The patient no longer complains of that oppressive sense of heat, tension, throbbing, &c. experienced at first, and he can now bear a moderate light, without such an effusion of tears as was previously occasioned. In this state, however red soever the tunica conjunctiva may appear, it is no longer affected with acute inflammation, and the ophthalmy has relapsed, from its acute stage, into that attended with relaxation and weakness of the vessels of the conjunctiva, and membranous lining of the eyelids. Emollients are now improper; in lieu of them, astringent, corroborant collyria should be used, by means of which the relaxed vessels of the conjunctiva and eyelid will recover their original tone, and the ophthalmy be totally removed. One of the following eye-waters, which are similar in quality to those directed by Scarpa, may be employed: ℞. *Zinci Vitriolati gr. v. Aquæ Rosæ* ʒiv. *Misce.* Or ℞. *Cerussæ Acetatæ gr. viij. Aquæ Fœniculi* ʒvj. *Spiritûs Vini Camphorati gutt. x. Misce.* The mild ophthalmy, originating from causes which render it an epidemic, so quickly passes over the first inflammatory stage, that it is scarcely observable, and is, according to Scarpa, the only case in which cold astringent applications prove in the first instance beneficial.

Surgeons in this country certainly very often employ vitriolated collyria at first, in almost all cases of ophthalmy, and with great benefit; but, it is to be observed, that in general some days have usually elapsed before they are consulted. If the continental surgeons are accurate in their remarks, astringents must be very wrong in the first instance. Richter says:—*Quotidie observo quantum damni adferant oculis inflammatis sueta illa collyria adstringentia, quantum emolumenti emollientia.* *Fascicul.* 3, *p.* 101.

The Severe Acute Ophthalmy, is attended with the same kind of symptoms as the mild, but in a more aggravated form. The sensation of heat in the eyes is burning; the constriction of the whole eye and eye-lid spasmodic; the presence of even a faint light intolerable. Sometimes the effusion of tears is continual, very copious, and blended with mucus, which is apt to make the eye-lids adhere together. Sometimes this secretion is almost suppressed, and the eyes become preternaturally dry. The sympathetic fever is considerable, with restlessness, and intolerable pain at the back part of the head. The pupil is contracted, the conjunctiva of an uniformly deep red colour. On the anterior hemisphere of the eye, among the most prominent fasciculi of vessels, maybe distinguished a delicate vascular net-work, continued from one fasciculus to another, but, all being equally turgid with blood, and coiled as it were together, seem to form a kind of excrescence, which rises

above the surface of the eye, and has a tendency to project forwards, beyond the eyelids. (*Scarpa.*)

From the immoderate action of the inflamed vessels, blood is occasionally extravasated into the cellular substance, connecting the tunica conjunctiva with the sclerotica; in consequence of which the first of these coats, which is naturally loose, becomes enormously distended, and elevated in front of the eye, so as to make the transparent cornea seem quite sunk, and prevent the eye from being completely shut. *Chemosis* is the term usually applied to this sort of case.

The severe acute ophthalmy commonly affects only the outer part of the eye-ball; but, sometimes the interior of the eye is alone affected, or at all events, more so than the outer parts. There is little change in the external parts, the patient has immense aversion, even to the faintest light, the iris has a red appearance, the pupil is exceedingly contracted, and the aqueous humour is occasionally red and turbid. From these circumstances, Scarpa thinks it not irrational to suspect, that, in the highest pitch of internal ophthalmy, there may be an extravasation of blood into the chambers of the eye, especially betwixt the choroid and sclerotic coats Hence may arise the termination of the internal ophthalmy in amaurosis, so common, when the case does not end in suppuration.

The severe acute ophthalmy requires the antiphlogistic treatment, in the most rigorous degree. Tardiness in procuring evacuations, especially of blood, too often gives the disease time to advance to the state of chemosis; or else to a condition, in which suppuration, or an extravasation of lymph within the eye, is threatened; while, in other instances, the inflammation degenerates into an obstinate chronic ophthalmy from the extreme weakness produced in the vessels of the conjunctiva. Both general and topical blood-letting should, therefore, be speedily put in execution. Leeches should be applied to the vicinity of the eyelids, especially about the inner canthus, on the vena angularis, where it joins the frontal, deep orbitar, and transverse vein of the face. (*Scarpa.*)

Mr. Ware objects to leeches being put on, or very near the eyelids, as they have sometimes caused a considerable swelling of the lids, and increased, instead of lessening, the irritation. In ordinary cases, this gentleman recommends applying three in the hollow of the temple, about an inch and a half from the outer part of the orbit. There is one mode of bleeding, in cases of ophthalmy, perhaps productive of more benefit than any other, and this probably on account of its acting at once both as a general and topical evacuation; I mean opening the temporal artery. In some instances, it is true, I have seen the surgeon fail in procuring from this source a sufficient quantity of blood; but I have never seen a continuance of bleeding from the wound any longer than the practitioner himself wished.

There is one particular mode of taking blood from the eye, which, in acute inflammations, has sometimes been very useful. The visible blood-vessels on that part of the conjunctiva, which covers the inside of the eyelids, are much more numerous, than those which are observable on the white of the eye. Hence, in ophthalmy, the inflammation seems greatest on the inside of the eyelids, where the blood-vessels are often not only much increased in number, but also extremely full and turgid. Sometimes, also, the whole inside of the eyelids, particularly of the lower one, is so much enlarged, as to be constantly turned out. In both these cases great benefit has been derived from scarifying the inner surface of these parts with a lancet, by means of which a considerable quantity of blood has been removed. When the upper eyelid is very œdematous in ophthalmy, and its thickness prevents the application of remedies to the eye, a few punctures made on the outside of the lid, near its edge, will cause the discharge of a bloody water, and a very quick subsidence of the swelling. When the tumefaction of the everted eyelids is very considerable, great and speedy relief has been given, by cutting off a piece from the inside of each of them with a pair of curved scissars. (*Ware, p.* 39, 40.)

General bleeding, though copious, and assisted by the topical application of leeches, does not always prove adequate to remove the high degree of inflammation, attendant on chemosis. It is expedient to employ additional means, in order to give exit to the blood effused in the cellular substance, between the conjunctiva and sclerotica, by which the former is raised so much above the level of the cornea. Scarpa recommends, for this purpose, making a circular incision in the conjunctiva, near the margin of the cornea, with a pair of curved scissars. As a lancet, however, makes a cleaner cut than these instruments, it is perhaps preferable for the operation, and scarifications might suffice, both for the discharge of the extravasated blood, and of that distending the vessels of the conjunctiva itself. In chemosis, Mr. Ware says, there cannot be an easier or a more effectual remedy than æther. A few drops are to be poured into the palm of the hand, and diffused over it, which may be immediately done by pressing the other hand against it. The hand is then to be applied to the eye, and kept so close to it that the spirit, as

it evaporates, may insinuate itself into the part affected, and act on the extravasated blood, so as to disperse it. In a few instances of chemosis, in which the swelling and inflammation have been considerable, this gentleman has found the following application of singular service: ℞. Interiorum foliorum recentium Lactucæ Sissilis ℥iij. Coque cum aq. pur ℥ss. in balneo mariæ pro semihora; tunc exprimatur succus, et applicetur paululum ad oculos et ad palpebras sæpe in die. (*Ware*, *p.* 54.)

After general and topical bleeding, aperient medicines, of the most gentle nature, should be administered; soda phosphorata, pulp of tamarinds, cream of tartar, and magnesia vitriolata, are the most proper. When the stomach is affected, Scarpa also recommends an emetic, as being peculiarly beneficial to inflamed eyes.

When bleeding and other evacuations have been practised, the next most useful measure is the application of a blister to the nape of the neck. Scarpa observes, that the skin in this situation, and that behind the ears, sympathise more closely with the eyes than any other part of the integuments. Many practitioners, however, and among them Mr. Ware, prefer blistering the temples. The latter says: "When the leeches have fallen off, and the consequent hemorrhage has ceased, I would advise a blister of the size of half-a-crown, to be applied on the temples, directly over the orifices made by the leeches, and I have found, that the sooner the blister has followed the bleeding, the more efficacious both have proved." When the ophthalmy has been very violent, and resisted the common method, Mr. Ware adds, that the most beneficial effects have also been sometimes produced by the application of a blister large enough to cover the whole head. (*P.* 43, 44.)

At first, topical emollient applications to the eye are most beneficial; such as mallows boiled in new milk; bread and milk poultices; or the soft pulp of a baked apple; all included in fine little muslin bags. Remedies of this description should be renewed at least every two hours. The patient should be directed to observe perfect quietude, and to lie with his head in an elevated position. To keep the eyelids from adhering together, in the night-time, the sperma-ceti cerate is proper. When the ophthalmy is accompanied with a violent pain in the head, Mr. Ware recommends a strong decoction of poppy-heads to be applied as a fomentation. (*P.* 51.)

Under the preceding plan of treatment, the acute stage of severe ophthalmy commonly abates in about a week. The burning heat and darting pains in the eyes, and the febrile disturbance of the constitution subside. The patient is comparatively easy, and regains his appetite. The eyelids lose their tension and wrinkle. A discharge of thick matter takes the place of a secretion of thin serum, or of a preternaturally dry state of the eyes. These organs can now be opened, without experiencing vast irritation from a moderate light. In this state, notwithstanding the eyes may continue red, and the conjunctiva swollen, all evacuations are to be left off, as well as the use of topical emollients, for which latter astringent, corroborant collyria are to be substituted. Scarpa recommends the following application: ℞. Zinci vitriolati gr. vj. Aquæ distillatæ ℥vj. Mucil. sem. cydon. mali ℥j. Spiritûs vini camphor guttas paucas. Misce et cola. This collyrium may be injected, with a syringe, between the eye and eyelids, once every two hours; or the eye may be bathed in it, by means of an eye-cup. Such persons as cannot bear cold applications to the eye, must have the same kind of collyrium a little warmed; but as soon as the irritability has lessened, they may be used cold.

The tinctura thebaica of the old London Dispensatory proves a most efficacious remedy for the second stage of acute ophthalmy, or that connected with weak vascular action in the part affected. Two or three drops may be insinuated, between the eyelids and globe of the eye, twice a-day, in common cases; but in others, attended with more sensibility, once will at first be sufficient. Mr. Ware, who brought this application into repute, has found, that introducing two or three drops of this medicine at the inner canthus, and making them glide gradually over the eye, by gently drawing down the lower eyelid, proves equally beneficial, and less painful than dropping them at once on the eye-ball. Immediately the application is made, it commonly creates a copious flow of tears: a smarting pain, and a sense of heat in the eyes, which inconveniences, however, soon cease, and the eyes become clearer, and feel evidently improved. But notwithstanding every exaggerated assertion, unbiassed surgeons are now quite convinced, that the tinctura thebaica is only a proper application, when the inflammatory action has been previously diminished by blood-letting, aperient medicines, and blisters, and when the action of the vessels has been weakened by the continuance of the disease. Mr. Ware, in recommending it, as a most effectual application, in every species and stage of the disorder, from the most mild and recent, to the most obstinate and inveterate, (*p.* 51.) has certainly been rather too zealous. Scarpa has seen the necessity of limiting the use of the remedy in question, and he

has expressly pointed out, that it is only useful, when the violence of the pain, and the aversion to light have abated. Indeed, Mr. Ware himself has acknowledged, a little before sanctioning its unlimited employment in all cases, that, in certain instances, in which the complaint is generally recent, the eyes appear shining and glossy, and feel exquisite pain from the rays of light, no relief at all was obtained. (P. 48, 49.) See *Tinctura Thebaica.*

Whenever the patient can easily bear a moderate degree of light, all coverings should be removed from the eyes, except a shade of green or black silk. A brighter light should be gradually admitted every day into his chamber, so that he may become habituated, as soon as possible, to the open day-light. Nothing has a greater tendency to keep up and increase the morbid irritability of the eyes, than keeping them unnecessarily long in a dark situation, or covered with compresses and bandages. (*Scarpa.*)

There is a particular species of severe acute ophthalmy, which differs from the common, in appearing with vehement inflammation and swelling of the conjunctiva and eyelids, and being followed by an extraordinary discharge of pus from the eye. It is very common in children at the breast, and is described as attacking adults on the sudden suppression of a gonorrhœa, or on the inadvertent application of the matter of clap to the eyes. These cases must be regarded as complicated with specific morbid action, and not in the light of simple inflammation, free from any diseased principle.

The *Purulent Ophthalmy*, of children produces such tumefaction of the eyelids, as almost prevents them from being separated. Should the surgeon succeed in gaining a view of the membrane lining them, it appears wrinkled, and converted into a red villous surface, somewhat like the inner coat of the rectum, when protruded in young children. (*Warner on the Human Eye, page* 42.) Sometimes in the child's fits of crying, the eyelids become everted, and continue so, until rectified by an attendant. No sooner is the first short attack of inflammation past, than there succeeds a discharge of thick yellow matter, truly surprising in quantity, partly secreted from the meibomian glands, but chiefly from that villous, fungus-like surface, into which the lining of the palpebræ seems converted. If the eyelids can be opened, the matter may be seen diffused over the whole surface of the eye, and its confinement, between the swollen eyelids and the eyeball, contributes still more to aggravate the pain, increase the inflammation, and often to induce ulcers, or specks, either over a part or the whole of the cornea. If a speedy check be not soon put to this distressing malady, it renders the cornea so opaque and thickened, as often to form what is termed *staphyloma.* The cornea has even been known to burst, the humours to be discharged, and the eye to sink into the orbit. The febrile symptoms are at first severe; the infant is continually fretful and restless, and a diarrhœa is not unfrequently concomitant. The affection of the eyes is occasionally accompanied with eruptions on the head, and with marks of a scrophulous constitution. (See *Ware, p.* 138, *&c.*)

The antiphlogistic treatment should be quickly opposed to the progress of the disease. The temporal arteries should be opened, or leeches applied to the temples, or neighbourhood of the eyelids, and a blister put on the nape of the neck, or temples. The child should be kept in a cool room, and not covered with much clothes. If no diarrhœa should prevail, it is proper to purge with a little rhubarb or magnesia in syrup of violets.

A surgeon, however, is seldom called in before the first short inflammatory stage has ceased, and an immense discharge of matter from the eyes has commenced. Of course emollient applications must generally not be used. On the contrary, astringents and corroborants are immediately indicated, in order to restore to the vessels of the conjunctiva and eyelids their original tone, to rectify the villous and fungous appearance of the lining of the palpebræ, and thus finally to check the morbid secretion of matter. For this purpose Mr. Ware strongly recommends the *aqua camphorata* of Bates's Dispensatory: ℞. Cupri vitriolati, Bol. Armen. ā ā ʒiv. Camphoræ ʒj. M. & f. pulvis, de quo projice ʒj. in aquæ bullientis ℔iv. amove ab igne, et subsidant fœces. Mr. Ware, in his late *Remarks on Purulent Ophthalmy*, 1808, observes, that he usually directs the aqua camphorata, as follows: ℞. Cupri vitriolati. Bol. Armen. ā ā gr. viij. Camphoræ gr. ij. Misce, et affunde aquæ bullientis ʒviij. Cùm lotio sit frigida, effundatur limpidus liquor, et sæpissimè injiciatur paululum inter oculum et palpebras. This remedy possesses a very styptic quality; but it is much too strong for use before it is diluted; and the degree of its dilution must always be determined by the peculiar circumstance of each case. Mr. Ware ventures to recommend about one dram of it to be mixed with an ounce of cold clear water, as a medium or standard, to be strengthened or weakened as occasion may require. (*P.* 143.) The remedy must be applied by means of a small ivory or pewter syringe, the end of which is a blunt-pointed cone. The extremity of this in-

strument is to be placed between the edges of the eyelids, in such a manner, that the medicated liquor may be carried over the whole surface of the eye. Thus the matter will be entirely washed away, and enough of the styptic medicine left behind to interrupt and diminish the excessive discharge. According to the quantity of matter, and the rapidity with which it is secreted, the strength of the application, and the frequency of repeating it, must be regulated. In mild recent cases, the lotion may be used once or twice a day, and rather weaker than the above proportions; but, in inveterate cases, it is necessary to apply it once or twice every hour, and to increase its styptic power in proportion; and when the complaint is somewhat relieved, the strength of the lotion may be lessened, and its application be less frequent.

"The reasons for a frequent repetition of the means just mentioned, in bad cases, are, indeed, of the most urgent nature. Until the conjunctiva is somewhat thinned, and the quantity of the discharge diminished, it is impossible to know in what state the eye is; whether it is more or less injured, totally lost, or capable of any relief. The continuance, or extinction, of the sight frequently depends on the space of a few hours: nor can we be relieved from the greatest uncertainty, in these respects, until the cornea becomes visible." (*Ware*, *p.* 145.)

This gentleman, with every appearance of reason, condemns the use of emollient poultices, which must have a tendency to increase the swelling and relaxation of the conjunctiva. If poultices are preferred, he particularly recommends such as possess a tonic or mild astringent property; as one made of the curds of milk, turned with alum, and an equal part of unguentum sambuci, or axungia porcini. This is to be put on cold, and frequently renewed, without omitting the use of the injection. (*Ware*, *p.* 147.)

When the secreted matter is glutinous, and makes the eyelids so adherent together that they cannot be opened, after being shut for any length of time, the adhesive matter must be softened with a little fresh butter mixed with warm milk, or by means of any other soft oleaginous liquor, after the poultice is taken off, and before using the lotion. (*P.* 147.)

If the eversion of the eyelids only occurs when the child cries, and then goes off, nothing need be done in addition to the above means. When, however, the eversion is constant, the injection must be repeated more frequently than in other cases; the eyelids put in their natural position, after its use; and an attendant directed to hold on them, with his finger, for some length of time, a compress dipped in the diluted aqua camphorata. (*P.* 148.)

In some cases, when the inside of the eyelids has been very much inflamed, the tinctura thebaica, insinuated between the eye and eyelids, has been useful. If after the morbid secretion is checked, any part of the cornea should be opaque, the unguentum hydrargyri nitrati, melted in a spoon, and applied accurately on the speck, with a fine hair pencil; or Janin's ophthalmic ointment, lowered and used in the same manner; may produce a cure, if the opacity be not of too deep a kind. When the local disease seems to be kept up by a bad habit, alteratives should be exhibited, such as the æthiops mineralis, or small doses of calomel.

The *Purulent Ophthalmy*, arising either from suppression of gonorrhœa, or from the inadvertent conveyance of gonorrhœal matter to the eyes, is said to produce rather a swelling of the conjunctiva, than of the eyelids, which is followed by a discharge of a yellow greenish matter, similar to that of clap. The heat and pain in the eyes are considerable; an aversion to light prevails, and, in some instances, an appearance of hypopion is visible in the anterior chamber of the aqueous humour. When the complaint proceeds from the second cause, it is described as being less severe.

If it be actually true, that, in adults, a species of purulent ophthalmy does originate from the sudden suppression of a gonorrhœa, are we to consider the complaint so produced as a metastasis of the disease from the urethra to the eyes? This ophthalmy does not regularly follow the suppression of gonorrhœa; nay, it is even a rare occurrence: also, when it is decidedly known, that the purulent ophthalmy has arisen from the infection of gonorrhœa, namely, in those instances, in which the matter has been incautiously communicated to the eyes, it appears, that such an affection of these organs, so produced, is different from the one alluded to, inasmuch as it is slower in its progress, and less threatening in its aspect. Hence, there is good reason for supposing, that no metastasis takes place in this species of purulent ophthalmy, supposed to be connected with a suppressed gonorrhœa: but, we must be content with inferring that, if it really has such a cause, it originates from a sympathy, prevailing between the urethra and eyes, and, that the variation of irritability, in different people, is the reason, why it is not an invariable consequence of the sudden stoppage of a gonorrhœa.

The injection of warm oil, the introduction of a bougie into the urethra, and the application of cataplasms to the perinæum, with a view of renewing the dis-

charge from the urethra, form the outline of the practice of those, who place implicit reliance in the suppression of gonorrhœa being the cause of the complaint. The rarity of the occurrence; the frequency of the sudden cessation of the urethral discharge; the possibility of an ophthalmy arising, as well at this particular moment, as at any other, totally independently of the other complaint; cannot fail to raise in a discerning mind a degree of doubt, concerning the veracity of the assigned cause. Besides, admitting, that there is a sympathy, between the urethra and eyes, how are we to ascertain, whether the suppression of gonorrhœa be the cause or the effect of the ophthalmy, supposing that the one ceases, and the other commences, about the same time? Actuated by such reflections, I am induced to dissuade surgeons from adopting any means calculated to renew a discharge of matter from the urethra. When the purulent ophthalmy, in adult subjects, is decidedly occasioned by the actual contact, and infection of gonorrhœal matter, applied accidentally to the eyes, no one has recommended this unnecessary and improper practice.

The first indication, in the treatment of the disease from either cause, is to oppose the violence of the inflammation, and thus resist the destruction of the eye and opacity of the cornea. A copious quantity of blood should be taken away both topically and generally; mild laxatives should be exhibited, and a blister applied to the nape of the neck, or temples. The eyes ought to be often fomented with a decoction of white poppy-heads, and warm milk repeatedly injected beneath the eyelids. To prevent the palpebræ from becoming agglutinated together, during sleep, the sperma-ceti cerate should be smeared on the margins of the tarsi, every night.

When the heat and pain in the eyes, and febrile symptoms have subsided; when an abundant discharge of pus has commenced; all topical emollients are to be relinquished, and a collyrium of Aq. rosæ ℥x, containing Hydrarg. mur. gr. j. used in their place. Scarpa states, that in the ophthalmy, originating from the inadvertent communication of the matter of gonorrhœa to the eyes, applications, in the form of ointment, such as the ung. hydrarg. the unguentum ophthalmicum of Janin, to which might be added the ung. hyd. nitrat. avail more than fluid remedies. (*Scarpa.*)

Epidemic, Purulent, or Egyptian, Ophthalmy. The latter name has been given, in consequence of the very close resemblance, which this inflammation bears to that, which destroyed the sight of a considerable number of our soldiers in Egypt in 1801. Mr. Ware, however, objects to the appellation, because an ophthalmy, precisely similar in its symptoms and progress, has appeared long ago in this and other countries, and, in Egypt, as well as England, several varieties of ophthalmy prevail. This gentleman prefers calling the late epidemic affection of the eyes a *purulent* ophthalmy, since one of its chief symptoms, and that which distinguishes it from every other, is the profuse discharge of a purulent coloured fluid.—Some valuable practical remarks have been published in the Edinburgh Surgical Journal for January 1807, by my worthy friend Mr. Peach, who has enjoyed great opportunities of observation, from his having been surgeon to the 2d Battalion of the 52d Regiment, in which the disease has prevailed, perhaps, to an extent not witnessed in any other corps. The total strength of this regiment was 691 men, and, including relapses, Mr. Peach had 733 cases, without taking into the account some slight returns of the disease, which were obviated by venesection. Fifty men had lost the sight of both eyes, though Mr. Peach thought, that several of these would ultimately recover; for, he had already had some instances, in which the cornea recovered its transparency, after having been opaque for six months. Forty men had lost the sight of one eye. The perfect cures amounted to 404; and, when Mr. Peach's letter to Dr. M'Grigor was written, he had 213 cases under treatment. (*Edinb. Surg. Journ. for January* 1807.) The epidemic, now under consideration, is very different from an ophthalmy, which, at various times, has been epidemic in this, and other countries, without any purulent discharge from the eyes, which is seldom dangerous to sight, and, in a few days, generally yields to internal antiphlogistic means, and mildly astringent applications. (*Ware on the Epidemical Purulent Ophthalmy, Note, p.* 3; 1808.)

According to Mr. Peach, the patient complains, in the first stage of the disease, of being suddenly seized with a rolling of sand in his eye; the vessels on the albuginea become suddenly turgid with blood, and the lower palpebræ very vascular. The cases treated in this recent state, generally yield. But, if very active measures do not arrest the progress of the disease, the second stage appears, when the palpebræ superiores become much enlarged; the eyelids can only be opened with extreme difficulty; and then either a scalding fluid is discharged and excoriates the face, or a flux of thick yellow matter takes place. In this state, it is frequently in our power to stop the progress of the evil; but, if the most decided and active practice be not adopted, the disease reaches,

the third stage, in which every thing is seldom of any avail in relieving the most distressing symptoms. The cornea now too often becomes ulcerated, and the eye ruptured.

On the first appearance of the disease, Mr. Peach had recourse to venesection, and the antiphlogistic treatment. Being unsuccessful, he tried bark and stimulants; but, being still more unsuccessful with this mode of treatment, he reverted to the antiphlogistic plan in its fullest extent, and with the greatest success, and he found, that he did not formerly succeed, because he did not carry this mode far enough. It is in the commencement of the disease, that a very large quantity of blood should be taken away: in that stage, large venesection, even *ad deliquium animi*, is almost an infallible remedy. It is not sufficient to take away twenty or thirty ounces of blood. Mr. Peach has often taken away sixty, at the same time, enjoining perfect rest, the avoidance of all animal food, and putting in practice every other part of the antiphlogistic treatment. The complaint is naturally disposed to relapse, and, as often as the disease, or even the slightest pain, or uneasiness in the eye, returns, so often did this gentleman return to the lancet. Such practice, Mr. Peach confesses is likely to excite astonishment; but the fullest trial of it has demonstrated to him its utility. In many of the cases, which occurred to him, the progress of the inflammation was so rapid, that it probably would have totally destroyed the eye, if only the ordinary mode of treating ophthalmy had been resorted to. He advises particular attention to be paid to the first sensation of sand in the eye: he never defers venesection, when this is complained of; and the patient, in general, finds so much advantage during the operation, that he says, "the sand is removed." Mr. Peach has occasionally found advantage arise from dropping the undiluted aqua litharg. acetat. into the eye, though great pain was the immediate effect of its application. On the whole, however, he concludes, that dropping substances into the eye is not serviceable, and says, that, since this practice was relinquished, the eyelids have not been so often inverted. The bowels must be kept open. Benefit has often been derived from shaving the head, and keeping it continually wet with water, or vinegar. Blisters are also sometimes indicated; but, the great reliance is to be put in the strictest antiphlogistic regimen, and copious venesection. (See *Edinb. Med. and Surg. Journal, for January*, 1807.)

With regard to the causes of the epidemic purulent ophthalmy, Mr. Ware seems to think, that the complaint is commonly communicated by contact. Some of the worst cases of the purulent ophthalmy of children have happened in those, whose mothers were subject to an acrimonious discharge from the vagina at the time of parturition. Some of the worst forms of the purulent ophthalmy in adults have occurred in those, who, either shortly before the attack of the ophthalmy, or, at that very time, laboured either under a gonorrhœa, or a gleet. Mr. Ware does not mean to impute every purulent ophthalmy to such a cause; but, in the majority of adults, whom he has seen affected, if the disorder had not been produced by the application of morbid matter, from a diseased eye, it could be traced to a connexion, between the ophthalmy, and disease of the urethra. Other causes, Mr. Ware acknowledges, may contribute to aggravate, and, perhaps, produce the disorder, and the purulent ophthalmy in Egypt has been attributed to a great number. The combined influence of heat and light, of a burning dust continually raised by the wind, and of the heavy dews of the night, may powerfully tend to excite inflammations of the eyes. Yet something more must operate in causing the malignant ophthalmy now under consideration; for, the same causes operate with equal violence in some other countries, besides Egypt, and yet do not produce the same effect; and, in this country, (continues Mr. Ware) the disorder prevailed during the last summer, to as great a degree, and upon as great a number of persons, within a small district of less than a mile, as it ever did in Egypt; and, yet, beyond this space, on either side, scarcely a person was affected with it. The disorder was certainly brought into this country by the soldiers who returned from Egypt, and was probably communicated from them to many others. Now as the action of the atmosphere alone cannot account for the spreading of the disease, &c. Mr. Ware is led to believe, that this particular disorder is only communicable by absolute contact; that is, by the application of some part of the discharge, which issues, either from the conjunctiva of an affected eye, or from some other membrane secreting a similar poison, to the conjunctiva of the eye of another person. In schools and nurseries, in consequence of children using the same basins and towels, as others who had the complaint, the disease has been communicated to nearly twenty in one academy. Hence, Mr. Ware censures the indiscriminate use of those articles, in schools, nurseries, hospitals, ships, and barracks. (*P.* 14, 15.)

The principal difference, between the purulent ophthalmy of infants, and that of adults, consists in the different states of the tunica conjunctiva. In the former,

notwithstanding the quantity of matter, confined within the lids, is often profuse, the inflammation of the conjunctiva is rarely considerable, and whenever the cornea becomes impaired, it is rather owing to the lodgment of such matter on it, than to inflammation. But, in the purulent ophthalmy of adults, the discharge is always accompanied with a violent inflammation, and generally with a tumefaction of the conjunctiva, by which its membranous appearance is destroyed, and the cornea is made to seem sunk in the eye-ball. (*Ware, p.* 23.)

We have already detailed the successful plan of taking very large quantities of blood from the arm, as practised by Mr. Peach. Mr. Ware speaks also in favour of bleeding; but has rarely carried it to the extent, it has been in the army. In weak persons, this gentleman prefers, instead of repeating venesection, topical bleeding, either from the vein, that passes on the side of the nose, or by means of five or six leeches put on the temple. Sometimes, he thinks it better to scarify the inside of the lower eyelid, with the point of a lancet, carried along parallel to, and very near the margin of this part. Mr. Ware objects to pricking the eyelid in an infinite number of places, as very painful, and likely to increase the irritation. The lancet never need be applied more, than twice, and rarely more, than once; and, perhaps, less pain will be occasioned by making the incision with the edge, rather than the point of the lancet. After taking away blood, Mr. Ware says, a large blister on the head, or back, is often useful. Anodynes should be given, with occasional purgatives, and an antiphlogistic regimen. (*Ware on Purulent Ophthalmy*, 1808, *p.* 26, *&c.*)

Dr. Vetch, on the subject of local applications in the present disease, advises keeping the eyes continually covered with linen, dipt in some cooling lotion. In the first stage, he gives the preference to dropping the aqua sapphirina into the eye; afterwards, when the swelling of the eyelids has come on, he prefers the aqua litharg. acet. While the patient is subject to a recurrence of pain, he thinks, the injection of warm water the best application. For the purpose of lessening the swelling of the eyelids, he advises compresses, dipt in the aqua litharg. acet. to be applied with a moderately firm pressure. When the swelling, and other symptoms of the second stage have subsided, Dr. Vetch recommends more astringent applications, such as the aqua litharg. acet. Bates's camphorated water, solutions of alum, and the muriate of mercury. (See *An Account of the Ophthalmia, as it appeared in England since the return of the British Army from Egypt, by John Vetch, M. D.* 1807, *p.* 111.)

Mr. Ware gives the preference to the aqua camphorata, which is to be used exactly in the same way, as was described above, in speaking of the purulent ophthalmy of children. I cannot help thinking, that, if army surgeons had been careful to inject their applications under the eyelids, as advised by Mr. Ware, great benefit would have been produced. In other ways, the effect of the remedies is often lost. When the inflammation has been very great, Mr. Ware has only put four, or five grains, instead of eight, of the cuprum vitriolatum to eight ounces of water; and, while the inflammation is great, he would never advise more than eight grains to this quantity of water. He usually employs the lotion cold, especially in children; but, in some adults, in whom the general fever, and local inflammation have been considerable, he has been obliged to use it warmed. In cases of great pain and swelling, it should be very weak, less often applied, and, sometimes only warm water injected. In such circumstances, Mr. Ware also sanctions fomenting the eye with a flannel, or sponge, wet with a hot decoction of poppy-heads, or mere hot water. When the cornea threatens to burst, this gentleman approves of opening it, in order to discharge the aqueous humour, by making an incision in a place, where the scar will not obstruct vision.

Having now treated of all the principal species of acute ophthalmy, I shall finish this part of the subject with noticing Mr. Wardrop's proposal to puncture the cornea, and let out the aqueous humour in particular states of inflammation of the eyes. This gentleman remarks, that if the eye of a sheep, or ox, be squeezed in the hand, the whole cornea instantly becomes cloudy, and whenever the pressure is removed, this membrane completely regains its transparency.—From this curious phænomenon in the dead eye, it was evident, that, in the living body, the transparency of the cornea might vary according to the degree of its distention; and that, in cases of opacity of the cornea, accompanied with fulness of the eye-ball, its transparency might be restored by the evacuation of the aqueous humour. The cornea is little sensible, and, as every body knows, its wounds are free from danger. Mr. Wardrop soon met with a case, favourable for making the experiment; the cornea was milky and opaque, and the eye-ball distended and prominent, attended with acute inflammatory symptoms. The aqueous humour was discharged by a small incision, and the operation produced not only are-

moval of the cloudiness of the cornea, but an abatement of the pain, and a sudden check to all the inflammatory symptoms. From the success of this case, Mr. Wardrop was led to perform the operation on others, not only with a view of diminishing the opacity of the cornea, but, also, of alleviating the inflammation. Four interesting cases are related by this gentleman, very much in favour of the practice, when the eye is severely inflamed, attended with fulness of the organ, a cloudy state of the cornea, and a turbidness of the aqueous humour. Mr. Wardrop also advises the operation, whenever there is the smallest quantity of pus, in the anterior chamber, accompanied with violent symptoms of inflammation. He thinks, that, the great and immediate relief, which the method affords, is imputable to the sudden removal of tension; and he performs the operation with a small knife, such as is used for extracting the cataract. The instrument is to be oiled, and introduced, so as to make a wound of its own breadth, at the usual place of making the incision in the extraction of the cataract. By turning the blade a little on its axis, the aqueous humour flows out. (See *Edinb. Med. and Surg. Journal, Jan.* 1807.)

Mr. Ware seems to approve of Mr. Wardrop's operation in the *epidemic, purulent*, or *Egyptian Ophthalmy*, when, notwithstanding, general evacuations, topical bleeding, mildly astringent lotions, and a strict antiphlogistic regimen, the symptoms still continue, and, especially, if the cornea begin to lose its transparency, and a white rim appear round its circumference. Mr. Ware does not object to using a small knife, of the kind, employed in extracting the cataract; but, thinks a lancet will safely answer the purpose, or, what is better, a sharp-pointed couching needle, having a blade somewhat wider than usual, and a groove in its middle. The instrument, he advises, to be introduced about one-tenth of an inch before the connexion of the cornea with the sclerotica, and pushed gently on, parallel to the plane of the iris, until the aqueous humour make its escape. (*Ware on the Purulent Ophthalmy, p.* 41, 1808.)

CHRONIC OPHTHALMY.

Unfavourable peculiarities are met with in practice, which prevent the complete cure of the second stage of acute ophthalmy, or that connected with a weak vascular action in the part affected; whence the protracted disease becomes purely chronic, and threatens the slow destruction of the eye.

These peculiarities may be chiefly referred to three causes: 1. To an increased irritability continuing in the eye after the cessation of acute inflammation. 2. To some other existing affection of the eye, or neighbouring parts, of which the chronic ophthalmy is only an effect. 3. To constitutional disease.

1. That chronic ophthalmy may depend upon a morbid irritability of the eye is evinced, not only from its resisting topical astringents and corroborants, to which the disease from simple relaxation and weakness yields, but from its being exasperated by them, and even by cold water. The patient complains of a sense of weight in the upper eyelid, and restraint in opening it; the conjunctiva has a yellowish cast, and when exposed to the damp cold air, or a brilliant light, or when the patient studies by candle-light, its vessels become injected and turgid with blood. If, in combination with such symptoms, the habit of body be weak and irritable; subject to spasms; hypochondriasis, &c. then, it is manifest, that the chronic ophthalmy is connected with a general impairment of the nervous system.

2. Besides extraneous bodies, lodged between the palpebræ and eye-ball, the inversion of the ciliæ, and hairs, growing from the caruncula lachrymalis; ulcers of the cornea; prolapsus of the iris; herpetic ulcerations of the margins of the eyelids; a morbid secretion from the meibomian glands; a diseased enlargement of the cornea, or of the whole globe of the eye, &c. may occasion and maintain chronic ophthalmy.—It is only my part here to mention such remote causes; for, the particular treatment of them is described in other articles. (See *Cornea, Ulcers of*; *Iris, Prolapsus of*; *Lippitudo*; *Staphyloma*; *Hydrophthalmy*; *Trichiasis*, &c.)

3. The cure of the second stage of acute ophthalmy may be retarded by the prevalence of scrophula in the system; or by the small-pox affecting the eyes. Chronic ophthalmy is also sometimes a consequence of lues venerea.

When chronic ophthalmy depends upon preternatural irritability, the internal exhibition of bark with valerian is proper; animal food of easy digestion; gelatinous and farinaceous broths; wine in moderation; gentle exercise; living in salubrious and mild situations; are all severally productive of benefit. Externally, the applications should be of the sedative and corroborant kind; such as aromatic spirituous vapours (from the *spiritus ammon. comp.*) applied to the eye through a funnel, for half an hour, three or four times a day; and the eyelids and eye-brows may also be rubbed with the linimentum camphoræ.

Patients, both during the treatment and after the cure, must refrain from straining the eye, and, immediately the least uneasiness is felt, must desist from exercising it. When they write, or read, it should constantly be in a steady, uniform light, and too little, as well as too much, aggravates the disease. Having once begun to use spectacles, they should never study, or survey minute objects, without them. (*Scarpa.*)

I shall conclude the subject with a few remarks upon the cure of ophthalmy, when connected with constitutional disease.

SCROPHULOUS OPHTHALMY.

No specific being known for scrophula, the treatment, in this instance, rather consists in preventing the aggravation, than in attempting the radical cure of the complaint. Every thing debilitating is hurtful, as all evacuation; indigestible food; intense study; a sedentary life; damp marshy habitations; uncleanliness; frequent transitions from heat to cold. On the other hand, observing to regulate the action of the bowels with the mildest laxatives; and the administration of bark, either alone or conjoined with the tinct. guaiaci ammoniata, do good. Alterative medicines, and especially Æthiops mineralis, from gr. ss. to gr. xx. in the day, taken for a few weeks uninterruptedly; aqua calcis, in broth or gruel, at first, in the dose of ℥iij. at breakfast, and afterwards the same quantity, twice daily for a few months, uniformly adhering to a good regimen in diet; may tend much to abbreviate the duration of this obstinate species of the disease. (*Scarpa.*)

Mr. Ware has found, that the addition of xx to xxx gr. of the sal polychrestus of the Edinburgh Dispensatory, to each dose of bark, suffices to keep the bowels in a regular state, when there is a tendency to costiveness. In some cases, in which there was little appearance of inflammation, this gentleman found the eyelids so relaxed, and the eyes so irritable, that children would not open their eyes, even in the darkest room. In some such relaxed cases, very beneficial effects were produced by administering internally small doses of opium, night and morning, to abate the irritability. Sea-bathing is always serviceable in scrophulous ophthalmy, and, probably the mere residence on the sea-coast, and the respiration of the sea-air, may bring about some of those advantages, which have been exclusively attributed to bathing. Friction of the body with a flesh-brush, or flannel, should be employed morning and evening.

With regard to topical applications, those of a soft relaxing kind prove injurious, as also retirement into dark situations. Slightly astringent collyria; the ung. tutiæ, and the ung. hyd. nitrat. are proper when there are excoriations upon the eyelids, and when, from their occasional adhesion to each other, there is reason to suspect, that the sebaceous glands secrete an acrimonious fluid. Mr. Ware has also found that one drop of the thebaic tincture, dropped into the eye, once or twice in the course of the day, contributes greatly, both to abate the irritability and to increase the strength of the relaxed vessels. (*On Scrophulous Ophthalmy, p.* 26.) The same gentleman has occasionally mixed old verjuice with cold spring-water, at first, in the proportion of one part of the former to six of the latter, and increasing the quantity of verjuice, until, sometimes there has been an equal quantity of that and water. All coverings should be removed from the eyes, except a shade of green silk, and patients should be gradually habituated to a stronger light. Good air and exercise always tend to improve scrophulous constitutions, and thus, indirectly, the disease under consideration. Scrophula often disappears spontaneously, as children approach the adult state, and, if we only have it in our power to check its progress in the early stage of life, it seems to wear itself out afterwards, and whatever local effects, it may have produced, often disappear.

As the small-pox inoculation has at present almost generally been abandoned by the faculty in favour of the vaccine disease, there seems less occasion now for detailing circumstantially a very obstinate species of ophthalmy, induced by the former complaint. When the small-pox eruption is very abundant in the face, it causes a considerable swelling of this part of the body; the eyelids become tumefied, the eyes redden, and there ensues a discharge of a very thick adhesive matter, which agglutinates the palpebræ together; so that, if no steps be taken, the eyes will continue closed for several days in succession. The matter, confined between the eyelids and globe of the eye, being perhaps of an irritating quality, and injurious from the pressure it occasions on the surrounding parts, seems capable of exciting ulceration of the cornea, and even of irremediably destroying vision. When the pustules of the small-pox in other parts of the body have suppurated, they cicatrize; but, those, which happen within the margin of the cartilage of the eyelids, are prevented from healing by the diseased secretion, which is then secreted from the meibomian glands, and such ulcers result, as will sometimes last for several years, and even during life, if unremedied by art. (*St. Yves sur les Mal. des*

Yeux, p. 216, *Edit.* 12*mo.*) After the employment of the antiphlogistic treatment, should the disease, when treated with topical astringents and corroborants, yet baffle the efforts of the surgeon, setons in the nape of the neck, kept open for a long while, prove one of the most useful remedies. Scarpa has experienced much advantage from giving, every morning and evening, to a child, ten years old, a pill, containing one grain of calomel, one grain of the sulph. aur. antim. and four grains of cicuta in powder. It is obvious, that such a potent alterative, if ever serviceable in this case, will soon evince its efficacy, nor would it be justifiable to sport with the patient's constitution by continuing its use beyond a certain period, unless sanctioned by evident signs of its salutary effects on the disease of the eyes.

When great irritability prevails, a mixture, of three drams of the vinum antimoniale, and one dram of the tinctura thebaica, given in doses of five, or six drops, in any convenient vehicle, and, at the same time, applying externally the vapours of the spiritus ammon. comp. to the eye, constitute an excellent plan of treatment. In other cases, saturnine collyria, with a little camphorated spirit of wine, or white wine, in which a little sugar is dissolved; tinct. thebaica, Janin's ointment, &c. avail most. This treatment is also applicable to the chronic ophthalmy from measles.

When inveterate ulcers remain upon the edges of the palpebræ, the disease may then be regarded as the psorophthalmy, described by Mr. Ware, and will demand the same method of cure. (See *Psorophthalmy.*)

VENEREAL CHRONIC OPHTHALMY.

Mr. Hunter entertained doubts, whether any inflammations of the eyes are syphilitic, and he appears to build his opinion upon two circumstances; one is, that if such cases be venereal, the disease is very different from what it is when it attacks other parts, and is attended with more pain, than venereal inflammation arising from an affection of the constitution: the second is, that he never saw these cases attended with such ulceration, as occurs when the complaint invades the mouth, throat, and tongue. (*Hunter on the Venereal, p.* 324.) In regard to the first circumstances, I can accurately state, that in several cases, reputed to have been venereal ophthalmy, which I have seen in St. Bartholomew's Hospital, the pain was by no means severe, or the chief part of the malady. The disorder seemed rather to consist in an impairment of vision, with here and there little distinct plexuses of dilated blood-vessels. If the pain should be actually more severe, than that accompanying other local symptoms of lues venerea, will not the natural sensibility of the eye satisfactorily explain this semblance of a well-marked disease deviating from its determinate character? In support of this observation, may I not remark, that the progress of a venereal bubo in the groin causes greater pain, than the formation of a node on the ulna, or tibia. As to the second reason for supposing no inflammations of the eyes are truly venereal, it cannot be considered as conclusive. Syphilis does not seem invariably to produce ulceration, in every situation, where it invades the human frame, and, in the bones, indeed, it would rather seem, in general, to give rise to a process of a directly different tendency, namely the formation of nodes; nor does it, according to Mr. Hunter's own sentiments, produce ulceration upon mucous membranes. Scarpa says, the venereal ophthalmy is peculiar in not discovering manifest signs of inflammation, stealing on clandestinely, *without much uneasiness.* It afterwards relaxes the vessels of the conjunctiva and lining of the palpebræ, and changes the secretion of Meibomius's glands. In time it causes ulceration of the margins of the eyelids; the ciliæ fall off, and the cornea grows opaque. In the worst stage, it excites itching in the eyes, which is exasperated at night, and abates in violence towards morning, as do almost all the effects of syphilis. It never attains the state of chemosis.—(*Scarpa.*)

In the few cases, which have fallen under my own observation, the decoct. sarsap. and hydrarg. mur. have constantly improved the condition of the eye, and, when taken, for a sufficient time, have cured the disease. I do not mean to assert, that these instances were unequivocally venereal ophthalmies, I can only say, that they were reputed to be such, and yielded to the above medicines. In some cases, mezereon, guaiacum, and mercurial frictions, might be tried; and, I believe, in all cases, the use of a collyrium, containing hydrarg. muriatus, as Scarpa recommends, would assist the operation of internal medicines, in the cure of the disease. When the eyelids are ulcerated, the ung. hydrarg. nitrati, weakened at first by the addition of twice, or thrice its quantity of hog's lard, is the best topical application.

Some interesting observations on the ophthalmy, supposed to be venereal, may be seen in Saunders's Treatise on the Diseases of the Eye; but, having noticed these remarks in another publication, I shall avoid repeating them in the present place.

INTERMITTENT OPHTHALMY.

There is a description of ophthalmy, the symptoms of which intermit, or at least remit, at stated periods. Mr. Ware has not found bark so useful in this, as in scrophulous ophthalmy; but, he has known the hydrarg. mur. produce the most beneficial effects, and, sometimes, he has conjoined with its internal exhibition the decoct. sars. com. (See *Ware on Intermittent Ophthalmy.*)

On the subject of Ophthalmy, the reader may consult with advantage, Maitre-Jean, and St. Yves sur les Mal. des Yeux, Ware on Ophthalmy, Psorophthalmy, and Purulent Eyes of new-born Children: on Scrophulous and Intermittent Ophthalmy; also, Additional Remarks on Ophthalmy; and Remarks on the Purulent Ophthalmy lately epidemical in this country. There is a masterly account of Ophthalmy in Richter's Anfangsg. der Wundarzn. Band. 3. *The Edinburgh Med. and Surg. Journal for January* 1807, *contains Mr. Peach's and Mr. Wardrop's remarks. See, also, An Account of Ophthalmy, as it appeared in England, since the return of the British Army from Egypt, by John Vetch, M.D.* 1807. *But, in particular, the Observations of Scarpa, in cap.* 7. *of his work Sulle Principali Malattie degli Occhi, Vénez.* 1802, *merit notice: they have been ably translated by Mr. Briggs. Consult likewise a Treatise on Several Practical Points relative to the Diseases of the Eye, by J. C. Saunders, Edited by Dr. Farre,* 1811.

OPISTHOTONOS. (from οπισθεν, backward, and τεινω, to extend.) A spasmodic disease, in which the trunk is drawn backwards, with the head towards the shoulders: it is one of the varieties of tetanus.

ORCHOTOMIA. (from ορχις, a testicle, and τεμνω, to cut.) The operation of removing a testicle. See *Castration.*

ORIS CANCRUM. See *Cancrum Oris.*

OSCHEOCELE. (from οσχεον, the scrotum, and κηλη, a tumour.) A hernia situated in the scrotum.

OSTEOSARCOMA, or **Osteosarcosis.** (from οστεον, a bone, and σαρξ, flesh.) This term signifies the change of a bone into a substance, of the consistence of flesh. Bones are sometimes converted into a soft, lardy, homogeneous substance, resembling a cancerous gland, and it is this affection, which has most claim to the appellation.

Authors seem to apply the term *osteosarcóma* too much at random, as may be seen by referring to *Boyer on the Diseases of the Bones, Vol.* 1, *Chap.* 22. The disease, called *mollities ossium* certainly renders the bones soft and flexible, and their heads become softened, in cases of white swellings.

There is not much propriety, and, certainly, no necessity for calling these diseases osteosarcoma. The bones are also occasionally converted into a complete gelatinous mass. Boyer relates a very remarkable example, in which the whole humerus was destroyed in this way, nearly down to the elbow. (See *Vol.* 1, *Chap.* 22.)

OTA'LGIA. (from ους, an ear, and αλγος, pain.) The ear-ach.

OTITIS. (from ους, the ear.) Inflammation of the ear.

OZÆNA. (from οζη, a stench.) An ulcer situated in the nose, discharging a fetid, purulent matter, and sometimes accompanied with caries of the bones. Some authors have signified, by the term, an ill-conditioned ulcer in the antrum. The first meaning is the original one. The disease is described, as coming on with a trifling tumefaction and redness about the ala nasi, accompanied with a discharge of mucus, with which the nostril becomes obstructed. The matter gradually assumes the appearance of pus, is most copious in the morning, and is sometimes attended with sneezing, and a little bleeding. The ulceration occasionally extends round the ala nasi to the cheek, but, seldom far from the nose, the ala of which, also, it rarely destroys. The ozæna is often connected with scrophulous and venereal complaints. In the latter cases, portions of the ossa spongiosa often come away. After the complete cure of all venereal complaints, an exfoliating dead piece of bone will often keep up symptoms, similar to those of the ozæna, until it is detached. Mr. Pearson remarks, that the ozæna frequently occurs, as a symptom of the chachexia syphyloidea. It may perforate the septum nasi, destroy the ossa spongiosa, and even the ossa nasi. Such mischief is now more frequently the effect of the chachexia syphyloidea, than of lues venerea. The ozæna must not be confounded with abscesses in the upper jawbone. See *Antrum.*)

The constitutional disease, on which the ozæna generally depends, and which acts as the remote cause, must be relieved, before a cure of the local effect can be expected. The internal medicines, which may be necessary, are preparations of mercury, and antimony; sarsaparilla, elm bark, Peruvian bark, muriated barytes, and muriate of lime. Sea-bathing may also do good, by improving the health. The best external applications are said to be, preparations of copper, zinc, arsenic, mercury, the pulvis sternutatorius, and diluted sulphuric acid. (*Pearson's Principles of Surgery, Chap.* 12.)

P

PANA'RIS. (from παρα, near, and ονυξ, the nail.) See *Whitlow.*

PANNUS. (from πονεω, to labour.) When two, or three pterygia, of different sizes, occurred on the same eye, with their points directed towards the centre of the cornea, where they met, and covered all the surface of this transparent membrane with a dense pellicle, the ancients named the disease, *pannus.* (*Scarpa, Chap.* 14.)

PA'PULA. (dim. of *pappa*, a nipple.) A pimple, or ulcerous tubercle.

PARACENTE'SIS. (from παρακεντεω, to perforate.) Surgeons, at present, restrict the meaning of this word to two operations, viz. tapping the abdomen, and making an opening into the chest. The first is called *paracentesis abdominis*, and is often necessary in cases of dropsy. The second is named *paracentesis thoracis*, and is sometimes proper in cases of emphysema, empyema, hydrops pectoris, and extravasations of blood in the chest.

TAPPING, OR PARACENTESIS ABDOMINIS.

When the swelling extends equally over the whole abdomen, the fluid is usually diffused among all the viscera, and is only circumscribed by the boundaries of the peritonæum. The water is occasionally included in different cysts, which are generally formed in one of the ovaries; and, in this case, the tumour, which is produced, is not so uniform, the fluctuation is not so distinct, as in the former instance; at least, this is the case while the disease has not made very great progress. The difference, also, in the consistence of the fluid, may render the fluctuation more, or less difficult of detection. When the water is contained in different cysts, it is frequently thick and gelatinous; but, when it is uniformly diffused all over the cavity of the peritonæum, it is generally thinner, and even quite limpid. Sometimes a considerable number of hydatids are found floating in the fluid, discharged in cases of ascites.

Whatever may be the efficacy of digitalis, mercury, diuretics, and other evacuants, in ascites, they are rarely of any service in cases of local and encysted dropsies. When such swellings continue to enlarge, notwithstanding the adoption of a few measures, which will presently be suggested, the sooner the fluid is evacuated, the better. It is also well known, that all efforts to produce a radical cure even of dropsies, which are not encysted, too frequently fail. I am decidedly of opinion, however, with Dr. Fothergill, that physicians would meet with much more success, in the treatment of ascites, if they would recommend paracentesis to be done sooner, than they generally do. This operation is, for the most part, much too long delayed; and during a long space, the bowels are continually suffering, more and more, from the effect of the large quantity of fluid, which oppresses them. What ought to render the practice of early tapping more entitled to approbation, is, that the operation, when done in the situation, we shall presently advise, is perfectly free from danger, attended with very little pain, and need not interrupt the further trial of such medicines, as the physician may place confidence in. Paracentesis only becomes a serious measure, when the disease has existed for a great length of time, and the patient has been much weakened by it. Indeed, there seems much reason to suspect, that the operation should be done, as soon as the tension of the abdomen, and the fluctuation, leave no doubt, concerning the nature of the malady; especially, when the first trials, which have been made of internal remedies, seem to promise no success. Dr. Fothergill has demonstrated by facts, the advantages of this method. On the commencement of an ascites, this celebrated practitioner advised the trial of diuretics and other evacuants. He then adds, that, "if by a reasonable perseverance in this course, no considerable benefit accrues; if the viscera do not evidently appear to be obstructed, and unfit for the purposes of life; if the complaints have not been brought on by a long habitual train of intemperance, and from which there seems little hope of reclaiming the patient; if the strength and time of life are not altogether against us; I desist from medicine, except of the cordial kind; and let the disease proceed, till the operation becomes safely practicable. When this is done, by the moderate use of the warmer diuretics, chalybeates and bitters, also the preparations of squills, in doses below that point, at which the stomach would be affected, I endeavour to prevent the abdomen from filling again." (*Med. Obs. and Inq. Vol.* 4, *p.* 112.) The same author remarks, with regard to encysted

dropsies, that tapping sometimes effects a radical cure.

Whenever a considerable quantity of fluid is suddenly let out of the abdomen by tapping, the quick removal of the pressure of the water off the large blood-vessels, and viscera, may produce swooning, convulsions, and even sudden death. These consequences led the ancients to consider paracentesis, as a very dangerous operation, and, when they ventured to perform it, they only let out the water gradually, and at intervals.

Dr. Mead, after considering what might occasion the bad symptoms resulting from too sudden an evacuation of a large quantity of fluid from the abdomen, was led to try what effect external pressure would have in preventing such consequences. This practitioner thought, that, in this way, he might keep up the same degree of pressure, which the fluid made on the viscera. The success, attending some trials of this plan, fully justified the opinion Dr. Mead had conceived; for, when the compression is carefully made, the whole of the water, contained in the abdomen of a dropsical patient, may be safely discharged, as quickly as the surgeon chooses. For this purpose, however, the whole abdomen must be equally compressed, the pressure increased in proportion as the evacuation takes place, and kept up, in the same degree, for several days afterwards. In St. Bartholomew's Hospital, while the water is flowing out, the necessary degree of pressure is usually made with a sheet, which is put round the abdomen. Two assistants, who hold the ends of the sheet, gradually tighten it, in proportion, as the fluid is discharged. Immediately, after the operation, some folded flannel, sprinkled with spirit of wine, is laid over the whole anterior part of the belly, and covered with a broad linen roller, applied with due tightness round the body. Dr. Monro invented a particular kind of belt, for the purpose; but, though it may be well adapted to the object in view, it is, perhaps, unnecessary, as the above method seems to answer every end.

The instrument used for tapping the abdomen, is called a trocar. (See *Trocar.*)

The most convenient position for the operation, is certainly when the patient is sitting in an arm-chair. However, weakness and other circumstances, frequently make it necessary to operate on the patient, as he lies in bed.

Until of late, the place, in which surgeons used to puncture the abdomen, in cases of ascites, was the centre of a line, drawn from the navel to the anterior superiour spinous process of the ilium, and, on the left side, which was preferred, in consequence of the liver not being there. The place, for the puncture, was usually marked with ink, and was supposed to be always situated just over a part of the linea semilunaris, where there is no fleshy substance, nor any large blood-vessel, exposed to injury. This calculation, however, was made, without considering, that, in dropsy, the parietes of the abdomen do not yield equally in every situation. On the contrary, it is known, that the front part is always more distended, than the lateral ones, and, that the recti muscles, in particular, are sometimes very much widened. In consequence of these alterations, induced by the disease, no dependence can be put on any measurement, made with a view of ascertaining the precise situation of the linea semilunaris. The surgeon, who trusts to his being able to introduce the trocar exactly in this place, from any calculation of the above kind, will frequently wound a great thickness of muscle, instead of a part, where the abdominal parietes are thinnest. But, a still stronger objection is to be urged against the practice of attempting to tap in the linea semilunaris. Men, well acquainted with anatomy, have frequently been deceived in their reckoning, and, instead of hitting the intended line with their trocars, they have introduced these instruments through the rectus muscle, and wounded the epigastric artery. Patients have died from this error, with large extravasations of blood in the cavity of the peritonæum. In a dropsical person, who has been tapped, it is to be observed also, that, an effusion of blood in the abdomen will of course more readily take place, in consequence of the parts not being in the same close, compact state, in which they are in the healthy condition.

Let every prudent practitioner, therefore, henceforth abandon the plan of tapping in the linea semilunaris, and, he may the more easily make up his mind to do so, as there is another place, where the operation may be done with the utmost facility and safety. The linea alba is now commonly preferred by the best surgeons; because, here no muscular fibres need be wounded, the place can be hit with certainty, and no large blood-vessel can be injured. About the middle point, between the navel and pubes, is as good a situation for making the puncture, as can possibly be chosen. The surgeon should introduce the trocar in a steady, firm manner, never in an incautious, sudden way, lest parts contained in the peritonæum should be rashly wounded. For the same reason, immediately the point of the trocar has entered the abdomen, a thing always known at once, by the sudden cessation of resistance to its

passing inward, it should be introduced no further, and its office of making a passage for the cannula is already accomplished. The surgeon, consequently, is now to take hold of the cannula with the thumb and index finger of his left hand, and gently insinuate it further into the cavity of the peritonæum, while, with his right hand, he is to withdraw the stilette. The fluid now gushes out, and regularly as it escapes, the sheet, which is round the patient's body, is to be tightened. All the water having been evacuated, a piece of flannel and a roller are to be immediately applied, as above explained, after putting a piece of lint and soap-plaster on the wound.

It is not uncommon for the water suddenly to stop, long before the full quantity is discharged. Sometimes, this happens from a piece of intestine, or omentum, obstructing the cannula. This kind of stoppage may be removed by just introducing a probe or director, and holding the portion of viscus back. When the water is very viscid, the only thing we can do is to introduce a larger trocar, if doing so should promise to facilitate the evacuation. Also, when hydatids obstruct the cannula, a larger instrument might allow them to escape. In encysted dropsies, the practitioner, of course, can only let the fluid out of such cavities, as he can safely puncture.

When a dropsy of the ovary is very large, it also admits of being tapped in the linea alba; but, in this particular case, it is generally best to make the puncture where the swelling is most prominent. In this disease, the ovary is, either converted into one large cavity, filled with fluid, or else it contains several distinct cells. The contents are sometimes exceedingly viscid. In early stages of the case, the tumour is situated towards one side of the abdomen, and seems to ascend out of the pelvis. This kind of progress at once distinguishes the disease from a common ascites, which is attended, from the first, with an equal, gradual, universal swelling of the abdomen. The cyst of the ovary, when it has attained a large size, generally adheres, in different places, to the inner surface of the peritonæum, and, in this state, the whole abdomen often seems uniformly swollen, in consequence of the immense magnitude of the disease. The impairment of the health, arising from the pressure of the viscera, and interruption of their functions, and the great difficulty of breathing, produced by the pressure on the diaphragm, make it necessary to let out the fluid, and paracentesis must be done, in the way already related. The disease is often attended with an almost total stoppage of the secretion of urine. Sometimes, the urine is duly secreted, but a retention occurs, so that the use of the catheter becomes indispensable. Tapping, however, can only be regarded as a palliative measure; the water collects again, the same grievances recur, and the operation must be repeated. While an ovarial dropsy is recent, and even after it has been tapped, some attempts may be made to effect a radical cure. Blistering the surface of the abdomen, keeping up a discharge with the savine cerate, and applying a tight roller, have been known to do good. In France, the celebrated Le Dran laid open the cysts of ovarial dropsies. His patients did not die of the consequent inflammation, and the dropsy, indeed, was cured; but, there remained either a sarcomatous enlargement of the ovary, which continued to increase till death, or else incurable fistulæ, leading into the cyst, were the consequences. The large size of a wound, necessary for this purpose, the danger of inducing inflammation in so extensive a surface, as the cyst of a large ovarial dropsy, and the events of Le Dran's cases, are circumstances, on the whole, quite enough to keep the practice from ever being revived.

A still more absurd plan has been attempted, viz. to cure the disease, by injections, just as hydroceles. I have seen two cases, in which red wine and water have been injected: one patient died very soon afterwards of the inflammation, and the other perished more lingeringly from the same cause. Setons have been tried, without success.

Sometimes, though very seldom, the operation of paracentesis is necessary for giving vent to collections of air in the abdomen. Air, when confined in this manner, is generally contained in the bowels, which it inflates to an enormous size. Instances, however, are related of quantities of air being confined between the peritonæum and intestines; but, in some of these cases, it is said, that the air was known to have escaped through a small hole in some part of the intestinal canal, and, it is probable, that all the other examples were of the same kind. This disease is named *tympanites*, and may render making an opening into the abdomen necessary. Notwithstanding authors generally recommend a small trocar for the purpose, there can be no doubt, that dividing the skin, and making a cautious puncture with a lancet through the linea alba, and peritonæum, would be a preferable mode of proceeding. The abdomen must also be compressed with a sheet, while the air is escaping, and, afterwards, with a roller, just as if the case were an ascites. Even when the air is contained in the bowels, if it should be enormous in quantity, occasion urgent symptoms, and

cannot be got rid of in other ways, authors recommend paracentesis.

PARACENTESIS OF THE THORAX.

The necessity for this operation is indicated, when the heart, or lungs, are oppressed by any kind of fluid confined in the cavity of the chest. Every body knows, that the free and uninterrupted performance of the functions of these organs is essential to the support of life. When the action of these viscera is disturbed by the lodgment of a collection of any kind of fluid in the thorax, no internal medicines can be much depended upon for procuring relief. The only means, from which benefit can be rationally expected, is letting out the fluid, by making an opening in the parietes of the chest.

The nature of the effused fluid can make no difference, in regard to the propriety of discharging it in this manner; and, though some authors have only treated of this operation, as applicable to cases of hydrops pectoris, and empyema, it may also be of the greatest service when air is confined in the chest, (see *Emphysema*,) or blood extravasated there (see *Thorax, Wounds of*,) so as to make dangerous pressure on the lungs and diaphragm.

In this place, I shall content myself with describing the best method of performing paracentesis thoracis, referring the reader to the articles just mentioned for information, concerning the particular symptoms and circumstances, which may render the operation proper, and the rest of the surgical treatment peculiar to each affection.

The safest, and most convenient situation, for making an opening into the chest, is between the sixth and seventh true ribs, on either side, as circumstances may render necessary. The surgeon should only recollect, that the two cavities of the pleura are completely distinct from each other, and have no communication whatsoever, so that, if fluid were contained on the left side of the thorax, making an opening into the right cavity would not serve for discharging the accumulated matter. The practitioner should also remember, that, when there is a fluid on both sides of the chest, paracentesis must never be done for the relief of the two collections at the same time; because, there is great reason to believe, that, as the lungs on one side usually collapse, when there is a free communication between the air and inside of the thorax, they would do so on both sides, were an opening made at the same time into each bag of the pleura. It is hardly necessary to remark, that, in this condition, the patient could not breathe, and would die suffocated. The operation consists, in making an incision, about two inches long, through the integuments, which cover the space between the sixth and seventh true ribs, just where the indigitations of the serratus major anticus muscle meet those of the externus obliquus. Here it is unnecessary to divide any muscular fibres, except those of the intercostal muscles, and, by putting the patient in a proper posture, the opening that is to be made, will be depending enough for any purpose whatsoever. The surgeon, avoiding the lower edge of the upper rib, where the intercostal artery lies, is then cautiously to divide the layers of the intercostal muscles, till he brings the pleura into view; when the membrane is to be very carefully divided with a lancet. The instrument should never be introduced in the least deeply, lest the lungs should be injured. The size of the opening in the pleura should never be larger than necessary. The discharge of blood and matter will of course require a freer aperture, than that of air, or water. If requisite, a cannula may be introduced into the wound, for the purpose of facilitating the evacuation of the fluid, and it may even in some cases, be proper to let this instrument remain in the part, in order to let the water, or pus escape, as often as another accumulation takes place. It is obvious, however, that a cannula, for this object, should only be just long enough to enter the cavity of the pleura, and should have a broad rim to keep it from slipping into the chest. A piece of sticking plaster would easily fix the cannula, which might be stopped up with a cork, or any other convenient thing, or left open, according as the circumstances of the case, and the judgment of the surgeon, should direct.

The paracentesis of the abdomen, and that of the thorax, are described in all treatises on the operations, and systems of surgery. The works of Sharp, Le Dran, Bertrandi, and Sabatier, are particularly deserving of attention.

PARA'LYSIS. (from παραλυω, to weaken.) A palsy. It is a symptom of several surgical disorders; as, for instance, of pressure on the brain, from blood, matter, or a depressed portion of bone; of injuries of the vertebræ and spinal marrow; of disease of these latter bones, &c. (See *Head, Injuries of; Dislocations; Fractures*; and *Vertebræ, Disease of.*)

PARAPHYMO'SIS, or PARAPHIMOSIS. (from παρα, back, and φιμοω, to bridle.) This signifies the case, in which the prepuce is drawn quite behind the glans penis and cannot be brought forward again. See *Phymosis*, with which it will be considered.

PARONY'CHIA. (from παρα, near, and ονυξ, the nail.) An abscess at the

end of the finger, near the nail." See *Whitlow.*

PAROTID DUCT. Every one acquainted with anatomy, is aware, that, behind the jaw, on each side, there is situated a large conglomerate gland, being the principal one of such as are destined to secrete the saliva, with which the cavity of the mouth, and the food, which we swallow, are continually moistened. The parotid duct crosses the cheek, being situated about one-third from the zygoma, and two-thirds from the basis of the jaw. After passing over the masseter muscle, it pierces the buccinator, and terminates in the mouth by a considerable orifice, opposite the space, between the second and third bicuspid grinders of the upper jaw. As soon as it has passed the masseter, it dives deeply into the fat of the cheek, and, as M. Louis observes, makes an angle before it opens into the mouth. (*Mem. de l'Acad. de Chir. tom.* 3. *p.* 457.)

From the situation of the parotid duct, it is liable to be wounded, and this has even been done, by the surgeon's lancet, through ignorance. (See *Monro's Works*, *p.* 520.) In cases of this kind, the continual escape of the saliva is apt to keep the wound from healing, and, what is called a *salivary fistula* would be the perpetual consequence, if no steps were taken to afford relief. The parotid duct has sometimes been ruptured by blows.—(*Œuvres Chir. de Desault*, *tom.* 2, *p.* 221.) Cases also occur, in which the face becomes considerably swollen, in consequence, of the saliva insinuating itself into the cellular substance, just as the air does in emphysema. On the last circumstance, I shall only just mention, that mischief of this kind must always be prevented from becoming very extensive, by making a depending opening for the ready escape of the fluid.

With regard to the treatment of salivary fistulæ, if the division of the parotid duct is recent, the sides of the wound should be brought into contact, and a steady pressure maintained on that part of the cheek, by means of suitable compresses, and a roller. In this manner, a salivary fistula may often be prevented altogether: either the divided ends of the duct reunite, and the spittle resumes its original course into the mouth; or, what is more probable, the wound in the face heals at every part, with the exception of a small fistulous track, which serves as a continuation of the duct into the inside of the mouth. The latter kind of cure, however, can only take place when the wound extends quite through the cheek; but, the chance of the two portions of the duct uniting, and becoming continuous again, should always be taken in recent cases.

When a salivary fistula is actually formed, a seton, introduced from the external fistulous orifice into the mouth, is a method which seems to have, with justice, the greatest share of approbation. The celebrated Monro adopted this plan with success: he kept in the seton till the channel, which it had formed, had become fistulous, after which it was withdrawn, the external orifice being touched with the argentum nitratum, healed up, and the saliva in future flowed through the artificial fistulous channel into the mouth.

Desault used to practise the seton as follows:—He introduced two fingers of his left hand into the patient's mouth, and placing them between the teeth and the cheek, opposite the fistula, thus kept the integuments tense, and the gums from being injured. He then introduced a small hydrocele trocar, with its cannula, just before the opening of the posterior part of the duct, and pushed through the cheek, in a direction a little inclined forward. An assistant now took hold of the cannula, while Desault withdrew the perforator, and passed through the tube a bit of thread, into the cavity of the mouth. The cannula was next taken out, and a seton, which was then fastened to the end of the thread in the mouth, was drawn from within outward; but not so far as to come between the edges of the external opening, where the thread alone lodged, and this was fastened with sticking-plaster to the outside of the cheek. The outer wound was dressed with lint and compresses. Desault used to change the seton daily, introducing regularly rather a larger one, and taking especial care not to bring it between the edges of the wound, which was afterwards covered with sticking-plaster. He enjoined the patient not to move the jaw much, and only allowed him, for some time, liquid food. In about six weeks he used to leave off the seton, leaving in the thread, however, for a little while longer. This being taken away, he used to finish the cure, by touching the little aperture remaining, with caustic.

The making of an artificial passage is one of the most ancient plans of curing salivary fistulæ. Every author has had his particular method of doing it, and numerous variations are to be met with, either in the instrument employed for piercing the cheek, or in the substance intended for maintaining the opening. For the first step of the operation, surgeons sometimes used the actual cautery, as Saviard furnishes us an instance of; sometimes an awl, as Monro did; sometimes a common knife, or lancet; sometimes a straight needle, which drew in the thread after it; but, Desault's trocar

generally merits the preference, because the cannula, by remaining in the wound, after the perforator is withdrawn, allows the thread to be introduced, which in every other way, is either difficult to accomplish, or requires the use of several instruments.

For the second step of the operation, viz. keeping the opening distended, cannulæ were employed by Duphénix, who used to make a suture over them; a plan objectionable, inasmuch as it was attended with the inconvenience of a solid body left in the parts, and also that of the instrument being apt to slip into the mouth. The seton, therefore, ought to be preferred, and there can be no doubt that Desault's method is better, than the one followed by Monro. See on this subject, *Monro's Works*; *Œuvres Chir. de Desault, par Bichat, tom.* 2, *p.* 221. Also *Mém. de l'Acad. de Chir. tom.* 3.

PARU'LIS. (from παρα, near, and ουλον, the gum.) An inflammation, boil, or abscess in the gums.

PEDILU'VIUM. (from *pes*, the foot, and *lavo*, to wash.) A bath for the feet.

PE'NIS, AMPUTATION OF. No part of the penis should ever be amputated, on account of a mortification, because the dead portion will be naturally thrown off, and the ulcer heal, without the least occasion for putting the patient to any pain from the employment of the knife. Some cancerous, and fungus diseases, are the cases, in which it is often really proper and necessary to amputate more or less of this part of the body.

The old surgeons, fearful of hemorrhage, used sometimes to extirpate a part of the penis, by tying ligatures round it with sufficient tightness to make it mortify and slough off. Thus, Ruysch removed the penis in one instance (See *Observ.* 30.) The plan, however, is exceedingly painful, and quite unnecessary, notwithstanding what Heister states in its favour.

The amputation may be done in the following manner:—A circular incision is to be made through the skin, about a finger-breadth from the cancerous part. The integuments are then to be drawn back, so as to expose the corpora cavernosa, which are to be divided with one stroke of the knife, on a level with the cut edge of the skin, in such a manner, that the extremity both of the skin and corpora cavernosa, is to form one wound, or surface. The bleeding arteries, are now to be immediately tied: the chief are, one on the dorsum of the penis, and one in each corpus cavernosum. When a general oozing from the wound still continues, some recommend (*White, Hey, &c.*) applying sponge to its surface; others (*Latta*) finely scraped agaric, with a small proportion of pounded white sugar, or gum arabic. Perhaps, however, finely scraped lint, supported with compresses, would be quite as effectual as any styptics, and, certainly, the latter applications should be avoided, if possible, because stimulating, and productive of pain and inflammation. A surer and preferable method of stopping the oozing of blood, and at the same time of healing the wound, might be to bring the skin forward, over the end of the stump, with two strips of sticking-plaster, after introducing a flexible gum catheter into the continuation of the urethra, so as to keep its orifice unobstructed, and the urine from coming into contact with the wound, whenever the evacuation is made. There can be little doubt, that the gum catheter would be better than a silver one, or any metallic cannula, commonly advised for the above purposes, because it lies in the passage with less irritation. In one case, in which Mr. Hey operated, he made a longitudinal division of the integuments, at the inferior part of the penis, so as to make them cover its extremity, without puckering, or laying over the orifice of the urethra. The corpora cavernosa, however, do not readily granulate and unite to the skin by the first intention. (*Hey, p.* 452.) After the first dressings are removed, the part should be dressed with the unguentum spermatis-ceti, or any mild unirritating salve.

In consequence of the introduction of a cannula being neglected, Le Dran mentions his having seen the orifice of the urethra become closed a few hours after the operation, so that the patient could not make water. The orifice of the passage could not be discovered without great difficulty. A lancet being introduced at the point, against which the urine seemed to be forced, a quantity of it gushed out, and, as a cannula was not at hand, a sound was introduced, till one could be procured. (*Traité des Oper. de Chirurgie.*)

Pearson, in his *Practical Observations on Cancerous Complaints*, has treated of this operation: he particularly advises the skin not to be drawn back, because, when saved in this manner, it impedes the free exit of the urine. He likewise disapproves of introducing cannulæ, as creative of pain, and spasms of the urethra, and being moreover unnecessary, since the stream of urine will always preserve the urethra in a permeable state. (*P.* 103.)

Sharp, Le Dran, Bertrandi, and Sabatier's books on the operations, may be consulted. Also, *l'Encyclopédie Méthodique; Partie Chir. Art. Verge. Hey's Practical Observations in Surgery, p.* 445. *Pearson on Cancerous Complaints, p.* 103, *&c. Warner's Cases in Surgery, p.* 278, *Edit.* 4.

PENIS, CANCER OF. A wart, or a tubercle, on the prepuce, the frænum, or the glans penis, is generally the first symptom, and it often remains in a quiet state for many years. When irritated, however, it becomes painful, and enlarges, sometimes enormously, in a very short time. At the same time, ulceration, and a discharge of sanious fetid matter, take place. The disease sometimes also occasions in the urethra fistulous openings, out of which the urine escapes, and the lymphatic glands in the groin may become affected as the disease advances. Mr. Pearson says, that "cancerous excrescences have a broad base, often more extensive, than their superficies; they seem to germinate deeply from within, or rather to be a continuation of the substance of the part; and, in their progressive state, the contiguous surface has a morbid appearance." What Mr. P. considers as a venereal wart, has a basis smaller, than its surface; its roots have rather a superficial attachment, and the contiguous parts have a natural appearance, p. 97. Such are this gentleman's marks of discrimination. We might question, however, whether Mr. Pearson, notwithstanding his great opportunities, ever saw a real *venereal* wart. For many years past I have never seen any excrescences of this kind, in St. Bartholomew's hospital, which truly required mercury for their cure, or which, when cured without it, were followed by any inconvenience. If my memory does not fail me, Mr. Abernethy also disbelieves in the doctrine of venereal warts.

Foul, spreading, sloughy ulcers of the penis, should be discriminated from cancer. It is worthy of attention, that almost all the cases of cancer of the penis recorded by Mr. Hey, were attended with a congenital phymosis. (See *Pearson on Cancerous Complaints, and Hey's Practical Observations in Surgery.*)

PERINÆ'UM, FISTULÆ OF. See *Fistula in Perinæo.*

PERITONI'TIS. An inflammation of the peritonæum. Surgeons have chiefly to combat this dangerous affection, in cases of hernia, lithotomy, wounds of the abdomen, fractures of the pelvis, &c. but as the necessary treatment is detailed in the particular articles of this dictionary, we need not here enlarge upon the subject.

PE'RNIO. (from περνα, or πτερνα, the heel.) A chilblain, especially one on the heel. See *Chilblain.*

PESSARY. (from πισσω, to soften.) The intention of pessaries, among the old practitioners, was to hold such medicinal substances, as they wished to apply within the pudenda. *Est autem pessulus* (says Paulus) *lana pectita, et quodcunque aliud teres digiti humani speciem præferens in quo medicamenta sustinentur.* The ancients not only used wool for making pessaries, they employed also silk, lint, and linen, rolled up, and tied round with a thread, by means of which these substances were withdrawn. Instead of these materials, gums, resins, and wax, were afterwards employed, and, being softened, were moulded into the most convenient shape.

Pessaries are now never made use of except for preventing a prolapsus of the uterus, or vagina, or for keeping up a very uncommon kind of rupture, explained in the article *Hernia.* The moderns also make their pessaries of much firmer materials, than those employed by their predecessors. Metals, wood, box-wood, sponge, elastic gum, and cork, covered with a layer of wax, have been used by different practitioners.

Linen pessaries, covered with wax, are, perhaps, as unobjectionable as any. Being softer, than metallic ones, they are not so likely to injure the parts, on which they press. They are not liable to rust, nor can they, like ivory ones, lose their proper shape. When properly covered with wax, they do not absorb, like those made of sponge, nor can they occasion any inconvenience by remaining long applied. For a particular detail of the manner of making them, see *Journal de Médecine, Tom.* 34.

Dr. Denman's pessaries are globular, formed of sound, well-seasoned, box-wood, perfectly spherical without, and excavated within, by which they acquire great lightness. They have four small holes, which, admitting the air, diminish the chance of their cracking. Dr. Clarke's pessary is an oval flat one, made of box-wood, about a quarter of an inch thick, at its external surface, but thinner towards its centre, where there is a small hole. (See *Savigny's Engravings of Instruments.*)

PETE'CHIA. (from *petechio*, a flea-bite. Ital.) A spot on the skin, which does not raise the surface, and which resembles a flea-bite.

PHAGEDÆ'NA. (from φαγω, to eat.) An ulcer, which spreads, and as it were eats away the flesh. Hence, the epithet, *phagedenic*, so common among surgeons.

PHALANGO'SIS. (from φαλαγξ, a row of soldiers.) A disease, in which there are two rows of hairs on the eyelids, or in which the eye-lashes turn inward. See *Trichiasis.*

PHARYNGOTOMY. (from φαρυγξ, the pharynx, and τεμνω, to cut.) See *Œsophagotomy.*

PHARINGO'TOMUS. (from φαρυγξ, the throat, and τομη, an incision.) An instrument for scarifying the tonsils, when inflamed, or for opening abscesses

about the fauces. It was invented by M. Petit, and is nothing more, than a sort of lancet, which is inclosed in a sheath. By means of a spring the point is capable of darting out to a determinate extent, so as to make the necessary wound, without risk of injuring other parts.

PHLEBOTOMY. (from φλεψ, a vein, and τεμνω, to cut.) The operation of opening a vein, for the purpose of taking away blood. See *Bleeding*.

PHLEGMON, PHLEGMONE. (from φλεγω, to burn.) Healthy inflammation. See *Inflammation*.

PHLOGO'SIS. (from φλογοω, to inflame.) An inflammation. A flushing.

PHLYCTÆNA. (from φλυζω, to be hot.) A small vesicle, containing a limpid fluid.

PHRENITIS. (from φρενες, the diaphragm, supposed by the ancients to be the seat of the mind.) An inflammation of the brain. Phrenzy.

Inflammation of the brain is a frequent consequence of injuries of the head. There is an increased and disordered state of the sensibility of the whole nervous system; the retina cannot bear the usual stimulus of light; the pupils are contracted; the pulse is frequent and small; the eyes are red and turgid, perhaps in consequence of the ophthalmic artery arising from the internal carotid; the countenance is flushed, and the patient is restless, mutters incoherently, and grows wild and delirious.

Phrenitis is treated on the antiphlogistic plan. Copious bleedings, and other evacuations, are highly proper. The blood should be taken from the temporal arteries. The skin ought to be kept moist with antimonials, and a counter-irritation should be excited on the scalp by blisters.

PHY'MA. (from φυω, to grow.) A tumour. According to Pott, this term was formerly applied to an inflammation near the anus. See *Anus, Abscesses of*.

PHYMO'SIS, or rather PHIMO'SIS. (from φιμοω, to bind up.) A disease of the penis, in which the prepuce cannot be drawn back, so as to uncover the glans. Both the phymosis, and paraphymosis, according to Mr. Hunter, arise from a thickening of the cellular membrane of the prepuce, in consequence of an irritation, capable of producing considerable and diffused inflammation. A chancre is the most frequent cause; but a mere inflammation and discharge from the glans and prepuce, and also a gonorrhœa, may bring on these affections. The inflammation often runs high, and is frequently of the erisypelatous kind. The cellular membrane being loose, the tumefaction becomes considerable, and the end of the prepuce being a depending part, the serum often lodges in it, and makes it œdematous. A natural contraction of the aperture of the prepuce is very common, and persons so affected, have a natural and constant phymosis. Such a state of parts (says Mr. Hunter) is often attended with chancres, and it produces very great inconveniences during the treatment. When there is considerable diffused inflammation, a diseased phymosis, similar to the natural one, unavoidably follows; and whether diseased or natural, it may produce the paraphymosis, simply by the prepuce being brought back upon the penis. This tight part, then acting as a ligature round the body of the penis, behind the glans, retards the circulation beyond the constriction, so as to produce an œdematous inflammation on the inverted part of the prepuce.

The natural phymosis is so considerable, in some children, that the urine cannot pass with ease; but, the aperture of the prepuce generally becomes larger and larger as they grow older, and the bad consequences, which the phymosis might have occasioned in disease, are thus avoided.

In some persons, especially old men, the prepuce sometimes contracts without any visible cause whatever, and becomes so narrow as to hinder the water from getting out, even after it has got free of the urethra, and, consequently, the whole cavity of the prepuce becomes filled with urine, attended with great pain.

In the phymosis, when the prepuce swells and thickens, more and more of the skin of the penis is drawn forwards over the glans, and the latter part becomes at the same time pushed backward by the swelling against its end. Mr. Hunter says, he has seen the prepuce projecting, from such a cause, more than three inches beyond the glans, and its aperture much diminished.

Mr. Hunter also notices, that the prepuce often becomes, in some degree, inverted, by the inner skin yielding more, than the outer, and the part seems to have a kind of neck, where the outer skin naturally terminates. From the tightness and distention of the parts, the prepuce now cannot be drawn more back, so as to expose any sores, which may be situated under it. This state is frequently productive of bad consequences, especially, when there are chancres behind the glans; for, the glans being between the orifice of the prepuce and the sores, the matter sometimes cannot get a passage forward, between the glans and prepuce, and, consequently, it accumulates behind the corona glandis, so as to form a kind of abscess, which produces ulceration on the inside of the prepuce. This abscess

bursts externally, and, the glans often protruding through the opening, the whole prepuce becomes thrown towards the opposite side, and the penis seems to have two terminations. On the other hand (says Mr. Hunter) if the prepuce is loose and wide, and is either accustomed to be kept back in its sound state, or is pulled back to admit of the chancres being dressed, and is allowed to remain in this situation, till the above tumefaction takes place, the case is then named a *paraphymosis*. Also, when the prepuce is pulled forcibly back, after it is swelled, it is then brought from the state of a phymosis to that of a paraphymosis. The latter case is often attended with worse symptoms, than the former, especially, when it has first been a phymosis. The reason of this is, (continues Mr. Hunter) that the aperture of the prepuce is naturally less elastic, than any other part of it: therefore, when the prepuce is pulled back upon the body of the penis, that part grasps it more tightly, than any other portion of the skin of the penis, and more so, according to the inflammation. Hence, there are two swellings of the prepuce, one close to the glans; the other behind the stricture. The constriction is often so great, as to interrupt the circulation beyond it. This increases the swelling, adds to the stricture, and often produces a mortification of the prepuce itself, by which means the whole diseased part, together with the stricture, is, sometimes removed, forming, as Hunter ably expresses himself, a natural cure. In many cases, the skin and prepuce are not the only parts affected, adhesions, and even mortification may also take place in the glans, corpora cavernosa, &c. (See *Hunter on the Venereal*, 221, &c.)

TREATMENT OF PHYMOSIS.

A phymosis should be prevented if possible; therefore, says Mr. Hunter, upon the least signs of a thickening of the prepuce, which is known by its being retracted with difficulty and pain, the patient should be kept quiet; if in bed, so much the better, as in an horizontal position the end of the penis will not be so depending. If confinement in bed cannot be complied with, the end of the penis should be kept up, though this can hardly be done, when the patient is walking about. The object of this is to keep the extravasated fluids from gravitating to the prepuce, which they would hinder from being drawn back even more, than the inflammation itself.

As when there are sores, they cannot be dressed in the common way, injections must frequently be thrown under the prepuce, or the operation for phymosis performed. Mr. Hunter advises mercurial injections; either crude mercury rubbed down with a thick solution of gum-arabic; or calomel with the same, and a proportion of opium; or else a solution of one grain of the hydrarg. mur. in one ounce of water. Mr. Hunter also recommends the application of emollient poultices, with laudanum in them, and, before putting them on the part, to let it hang over the steam of hot water, with a little vinegar and spirits of wine in it.

When, with a phymosis, chancres bleed, Mr. Hunter says, the oil of turpentine is the best stimulus for making the vessels contract; but, when the hemorrhage proceeds from irritation, he recommends sedatives. Whatever is used, must be injected under the prepuce. When the inflammation has abated, he advises moving the prepuce occasionally to prevent its becoming adherent to the glans. He says, he has seen the opening of the prepuce, so much contracted from the internal ulcers healing and uniting, that there was hardly any passage for the water. If the passage in the prepuce, so contracted, be in a direct line with the orifice of the urethra, a bougie must be used. If otherwise, the operation of slitting up, or removing part of the prepuce, becomes necessary.

When matter is confined under the prepuce, in the manner above described, Mr. Hunter recommends laying the prepuce open, from the external orifice to the bottom, where the matter lies, as in a sinus, or fistula. However, Mr. Hunter thinks laying open the prepuce for the mere purpose of applying dressings unnecessary, as the sores may be washed with injections by means of a syringe.

The common operation for the phymosis consists in slitting open the prepuce, nearly its whole length in the direction of the penis. This plan is certainly the most eligible, when the matter of a chancre cannot escape from under the prepuce; because circumcision, which many surgeons, since Mr. Hunter's time, have preferred, would not suffice for giving vent to the accumulated pus. In many cases of phymosis, says Mr. Hunter, an operation is improper; for, while the inflammation is very considerable, such a measure might bring on mortification. He acknowledges, however, there are cases, in which a freedom given to the parts would prevent the latter event. When matter is confined under the prepuce, an opening is indispensable, and, if the patient should object to the common operation, an opening should be made with a lancet directly through the prepuce, or else with caustic. (See *Hunter on the Venereal Disease*, p. 232, *et seq.*)

When the prepuce is to be slit open,

director is first to be introduced under it, and the division is then to be made with a curved pointed bistoury, from within upward.

Many surgeons object to this operation, because the prepuce continues afterwards in a very deformed state; and they perform circumcision, or amputation of the prepuce, in the following manner. The prepuce is first taken hold of with a pair of forceps, as much of the part being left out, as is judged necessary to be removed. The removal is then accomplished by one sweep of the knife, which, directed by the blades of the forceps, is sure of making the incision in a straight and regular manner. A fine suture is next passed through the edges of the inner and outer portions of the skin of the prepuce, so as to keep them together. The only necessary dressings are lint, and, over it, an emollient poultice.

TREATMENT OF PARAPHYMOSIS.

The removal of the stricture in this case should always be effected, because its continuation is apt to produce a mortification in the parts, between the stricture and the glans. It may be done in two ways; either by compressing with the fingers all the blood out of the swollen glans so as to render this part sufficiently small to allow the constricting prepuce to be brought forward over it, with the aid of the other fingers; or by dividing the stricture with a knife. From the great success, which I have seen attend the first mode, I should not conceive the latter one so frequently necessary, as Mr. Hunter seems to lay down. This operation is always troublesome to accomplish, because the swelling, on each side of the stricture, covers or closes, the tight part, so as to make it difficult to get at it. Mr. Hunter says, the best way is to separate the two swellings, as much as possible, where you mean to cut, so as to expose the constricted part; then take a crooked pointed bistoury, pass it under the constriction, and divide it. None of the swollen skin, on each side, should be cut. The prepuce may now be brought forward, unless it should be thought more convenient, for the purpose of dressing the chancres, to let it remain in its present situation. (See *Hunter on the Venereal Disease*, p. 238, 239.)

The original disease, producing phymosis and paraphymosis, must always be attended to, and the employment of mercury must be necessary, or unnecessary, according to the nature of the affection, of which these are only effects.

PILES. (See *Hemorrhoids*.)

PILULÆ AMMONIARETI CUPRI. ℞. Cupri Ammoniaci gr. xvj. Micæ Panis ℥iv. Aquæ Ammon. q. s. M. fiant pilulæ xxxii. (*Edinb. Disp.*) This is said to be the best form of exhibiting copper internally, which mineral some think worthy of trial in cases of gleets.

PILULÆ ARGENTI NITRATI. ℞. Argenti Nitrati gr. iij. Aquæ Distillatæ gutt. aliquot. Micæ Panis q. s. ut fiant pil. xx. The author of the *Pharmacopœia Chirurgica* suggests the trial of these pills in obstinate leprous, and other cutaneous affections, and phagedenic, anomalous ulcers, connected with constitutional causes. Two, or three may be given twice a day. Dr. Powell gave the argentum nitratum internally, in a case of hydrophobia, but, without any sensible effect. These pills are among the *formulæ selectæ* of Dr. Saunders.

PILULÆ CALOMELANOS. ℞. Calomelanos gr. xij. Conservæ Cynosbati quod satissit. M. fiant pil. xii. These are the calomel pills in common use. Surgeons give one, or two of them daily, as alteratives, in numerous cases. At Guy's Hospital, they add three grains of the pulvis opiatus to each pill, using syrup, instead of the conserve.

PILULÆ CALOMELANOS CUM CICUTA. ℞. Calomelanos gr. vj. Succi spissati Cicutæ ℥j. M. fiant pil. xii. One may be given thrice a day, in scirrhous, cancerous, scrophulous, and some anomalous diseases, resembling venereal ones.

PILULÆ CALOMELANOS CUM ANTIMONIO TARTARISATO. ℞. Calomelanos ℥j. Antimon. Tart. gr. xv. Opii Pur. ℥ss. Syrupi simpl. q. s. fiant pil. lx. One of these is given twice a day, in St. Thomas's Hospital, in cases of diseased joints. As the author of the *Pharm. Chirurg.* adds, they are also of use in herpetic affections, and obstinate ulcers. The union of antimony with quicksilver, according to Dr. G. Fordyce, quickens the specific operation of the latter.

PILULÆ CALOMELANOS CUM OPIO. ℞. Calomelanos ℥j. Opii Purif. gr. xii. Conserv. Cynosb. q. s. M. fiant pil. xii. When the object is to exhibit strong doses of calomel, one of these pills may be administered every night.

PILULÆ CALOMELANOS COMPOSITÆ. ℞. Calomelanos. Sulph. Antim. Præcip. sing. gr. xii. Guaiaci Gummi Resinæ gr. xxiv. Saponis q. s. M. fiant pil. xii. Similar to Plummer's pills. These are most excellent alteratives, in the dose of one twice a day. In tinea capitis, herpetic affections, and many anomalous diseases, they are exceedingly useful. Some diseased enlargements of the breast, and testicle, seem also to be benefited by them.

PILULÆ CICUTÆ. ℞. Succi Ci-

cutæ ʒss. Pulv. Herb. Cicutæ q. s. fiant pil. lx. These are the hemlock pills in use at Guy's Hospital. Cicuta is occasionally given in scrophulous, cancerous, and venereal cases. The surgeon should begin with small doses, and increase them gradually, till nausea and headach arise. From one, to a great number of these pills may be given, in this manner, every day.

PILULÆ CERUSSÆ ACETATÆ. ℞. Cerussæ Acetatæ gr. xii. Opii Purif. gr. vj. Conserv. Cynosbati q. s. M. fiant pil. xii. One may be given thrice a day. Gleets are, perhaps, the only cases, in which surgeons can employ these pills.

PILULÆ COLOCYNTHIDIS CUM CALOMELANE. ℞. Extracti Colocynth. comp. ℈ij. Calom. gr. xii. Saponis ℈j. Two of these operate as a purgative. They are the pills most frequently employed in the practice of surgery, for the purpose just specified.

PILULÆ CUPRI VITRIOLATI. ℞. Cupri Vitriolati gr. xv. Olibani Extracti Cinchonæ, sing. ʒij. Syrup. simpl. q. s. fiant pil. lx. From one to four of these pills may be given in a day, for gleets. (*Pharm. Chirurg.*)

PILULÆ HYDRARGYRI. Of these, I need only observe here, that the usual dose is ten grains. See *Mercury*.

PILULÆ HYDRARGYRI CALCINATI. One grain of this preparation is the dose, which is commonly taken at bedtime. See *Mercury*.

PILULÆ HYDRARGYRI CUM CICUTA. ℞. Hydrargyri purificati drach. j. Arabici gummi pulverisati drach. ij. Succi cicutæ spissati drach. j. Herbæ Cicutæ foliorum, in pulverem tritorum, q. s.

The quicksilver is to be first reduced by trituro with the gum-arabic, moistened with a little rain-water. The inspissated juice of hemlock is afterwards to be added, and lastly the powdered leaves in sufficient quantity to make a suitable mass for pills.

These, with a slight variation in the proportion of the hemlock, are the *pilulæ mercuriales* of Plenck, who directs three or four pills, each of three grains, to be given every night and morning.

There are, no doubt, many cases to which this formula must be very suitable; such, for instance, as the enlarged prostate gland, &c.

Dr. Saunders in his *Formulæ Selectæ* directs equal parts of pil. hydrarg. and succ. cicut. spissat. for these, or such like, purposes. (*Pharm. Chir.*)

PILULÆ NATRI CUM SAPONE. ℞. Natri ʒj. Saponis ℈j. M. fiant pil. xii. Four may be given thrice a day, in cases of bronchocele, and indurations of the absorbent glands from scrophula.

PILULÆ OPII. These need only be mentioned among such as are of eminent utility in surgery.

PILULÆ OPII COMPOSITÆ. ℞. Opii Purif. Camphoræ, sing. ʒi. Antim. Tart. gr. xv. Syrup. Simpl. q. s. fiant pil. lx. Used for alleviating pain, and keeping up a gentle perspiration; are particularly useful in preventing painful erections, in cases of gonorrhœa, chordee, &c. (See *Pharm. Chir.*)

PILULÆ ZINCI VITRIOLATI. ℞. Zinci Vitriol. ʒij. Terebinthinæ q. s. fiant pil. lx. One, or two, are occasionally given, in cases of gleets, thrice a day.

PLANTARIS MUSCLE. This long slender muscle of the leg is said to be sometimes ruptured, particularly in dancing. The surgeon can do little more, than advise rest, and the same posture of the limb, as in the rupture of the tendo Achillis. (See *Achilles, Tendon of.*)

PLEURITIS. (from πλευρα, the membrane lining the chest.) A pleurisy, or inflammation of the pleura.

PLEUROSTHOTONOS. (from πλευρον, the side, and τεινω, to stretch.) A spasmodic disease, in which the body is drawn to one side; a species of tetanus. (See *Tetanus.*)

PLICA POLONICA. (from *plico*, to entangle.) A peculiar disease, to which the inhabitants of Poland and Lithuania are subject: in this singular affection, the hairs of the head become adherent together, probably, in consequence of some morbid secretion from the scalp. It may be cured by the same means, which cure the scaldhead. (See *Tinea Capitis.*)

PNEUMATOCELE. (from πνευμα, wind, and κηλη, a tumour.) The wind-rupture; a case, which only existed in the imaginations of the old surgeons.

POLYPUS. (from πολυς, many, and πους, a foot.) A kind of tumour, which is generally narrow where it originates, and then becomes wider, somewhat like a pear; which most commonly is met with in the nose, uterus, vagina, and antrum; and which received its name from an erroneous idea, that it usually had several roots, or feet, like polypi, or zoophites.

POLYPUS OF THE NOSE.

Polypi more frequently grow in the cavity of the nose, from the Schneiderean membrane, than any other situation. Nasal polypi are visibly of different kinds; some being red, soft, and sensible; but, free from pain, and exactly like a piece of healthy flesh. This, which has been termed the *fleshy polypus*, is the most common, and fortunately the most easy of cure. Other polypi are called *malig-*

cant, being hard, scirrhous, and painful: some are said to be even capable of conversion into carcinoma. Richter describes another kind of nasal polypus, which is pale, very tough, and secretes a viscid discharge; which undergoes an alteration of its size with every change of the weather; and which is rather a relaxation, or elongation, of a part of the Schneiderean membrane, than a polypous excrescence. The whole membranous lining of the nostrils is sometimes relaxed, and thickened in this manner, so as nearly to fill up the whole cavity of the nose. (*Anfangr. der Wundarzn. Band.* 1. *Cap.* 21.)

Mr. Pott has taken great pains to shew, that there is one kind of polypus, originally *benign*; another originally *malignant*. He states, that those, which begin with, or are preceded by considerable, or frequent pain in the forehead and upper part of the nose, and which, as soon as they can be seen, are either highly red, or of a dark purple colour; those which, from the time of their being first noticed, have never been observed to be sometimes bigger, sometimes less, but have constantly rather increased; those, in which coughing, sneezing, or blowing the nose, gives pain, or produces a very disagreeable sensation in the nostril, or forehead; those which, when within reach, are painful to the touch, or which, upon being slightly touched, are apt to bleed; those which seem to be fixed, and not moveable by the action of blowing the nose, or of driving the air through the affected nostril only (when the polypus is only on one side); those which are incompressibly hard, and which, when pressed, occasion pain in the corner of the eye, and forehead, and which, if they shed any thing, shed blood; those which, by adhesion, occupy a very considerable space, and seem to consist of a thickening, or of an enlargement of all the membrane covering the septum narium; those which sometimes shed an ichorous, offensive, discoloured discharge; and those, round whose lower part, within the nose, a probe cannot easily and freely be passed, and that, to some height, ought not to be attempted, at least by the forceps, nor indeed by any other means; and this for reasons obviously deducible from the nature and circumstances of the polypus. On the one hand, the very large extent and quantity of adhesion will render extirpation impracticable, even if the disease could be comprehended within the forceps, which it very frequently cannot; and on the other, the malign nature of the distemper may render all partial removal, all unsuccessful attacks on it, and indeed any degree of irritation, productive of the most disagreeable consequences.

But, the polypi, which are of a palish or greyish light-brown colour, or look like a membrane just going to be sloughy; which are seldom or never painful, nor become so upon being pressed; which have appeared to be at one time larger, at another less, as the air has happened to be moist or dry; which ascend and descend freely by the action of respiration through the nose; which the patient can make to descend by stopping the nostril which is free, or even most free, and then driving the air through that which the polypus possesses; which when pressed give no pain, easily yield to such pressure, become flat thereby, and distil a clear lymph; and round whose lower and visible part a probe can easily, and that to some height, be passed, are fair and fit for extraction; the polypus, in these circumstances, frequently coming away intire; or if it does not, yet it is removable without pain, hemorrhage, or hazard, of any kind; the second of which circumstances Mr. Pott can with strict truth affirm, he never yet met with when the disease was at all fit for the operation.

Of the benign kind of polypus, fit for extraction, there are (says Mr. Pott) two sorts, whose principal difference from each other consists in their different origin or attachment. That which is most freely moveable within the nostril, upon forcible respiration; which has been found to be most liable to change of size, at different times and seasons; which has increased the most in the same space of time; which seems most limpid, and most freely yields lymph upon pressure, has its origin most commonly by a stalk, or kind of peduncle, which is very small, compared with the size of the polypus. The other which, although plainly moveable, is much less so, than the one just mentioned, which has been less liable to alteration from air and seasons; and which has been rather slow in arriving at a very troublesome size, is most frequently an elongation of the membrane covering one of the ossa spongiosa. These latter may be extracted with no kind of hazard, and, with very little pain, and hemorrhage: but the former require the least force, and mostly come away entire; while the others often break, come away piecemeal, and stand in need of the repeated use of the forceps. (*Pott on the Polypus of the Nose.*)

Mr. John Bell criticises the distinctions drawn by the preceding writer, and he says, that a polypus is never mild, nor ever malignant; time, and the natural growth of the tumour, and the pressure it occasions within the soft and bony cells of

the nostrils and jaws, must bring every polypus to one invariable form, in its last and fatal stage. Polypus, says Mr. John Bell, is indeed a dreadful disease; but, it becomes so by a slow progression, and advances by gradations easily characterised. Every polypus in its early stage is, according to this writer, a small moveable tumour, attended with a sneezing and watering of the eyes; swelling in moist weather; descending with the breath; but, easily suppressed with the point of the finger. It is void of pain, and not at all alarming; it may also be easily extracted, so as to clear for a time the passage for the breath. Yet this little tumour, simple as it may appear, is the germ of a very fatal and loathsome disease, and this easy extraction often the very cause of its appearing in its most malignant form. The more easily it is extracted, (says Mr. J. Bell) the more easily does it return; and whether carelessly extracted, or altogether neglected, it soon returns. But, when it does return, it has not really changed its nature; it has not ceased to be in itself mild, it is then to be feared, not from its malignity, but from its pressure, among the delicate cells and membranes of the nose. It soon fills the nostrils, obstructs the breathing, and causes indescribable anxieties. The tears are obstructed, and the eyes become watery from the pressure on the lachrymal sac; the hearing is in like manner injured, by the pressure of the tumour against the mouth of the eustachian tube; the voice is changed, and its resonance and tone entirely lost, by the sound no longer passing through the cells of the nose and face. The swallowing is in some degree affected by the soft palate being depressed by the tumour. The pains, arising from such slow and irresistible pressure, are unceasing. From the same pressure, the bones become carious, and the cells of the face and nose are destroyed by its slow growth. It is not long, before the tumour begins to project from the nostril in front, and over the arch of the palate behind. One nostril becomes widened and thickened; the nose is turned towards the opposite side of the face, and the whole countenance seems distorted. The root of the nose swells, and becomes puffy, the features tumid and flabby, the face yellow, and the parts round the eye livid. The patient is affected with head-achs, which seem to rend the bones asunder, and with perpetual stupor, and dozing. The bones are now absorbed, and the membranes ulcerate; a foul and fetid matter, blackened with blood, is discharged from the nostrils, and excoriates them. The blood vessels next give way, and sudden impetuous hemorrhages weaken the patient; the teeth fall from the sockets, and, through the empty sockets, a foul and fetid matter issues from the antrum.

Now the disease verges to its conclusion. The patient has terrible nights, and experiences a sense of suffocation. The repeated loss of blood renders him so weak, that he cannot quit his bed, for several days together; and when he does get up, he is (to use Mr. J. Bell's words) pale as a spectre, his lips colourless, and his face like wax, yellow, and transparent. He now suffers intolerable pain, while his saliva is continually dribbling from his mouth, and the fetid discharge from his nose. In this state, he survives a few weeks; during the last days of his illness, lying in a state of perpetual stupor, and dying lethargic. Mr. J. Bell, afterwards, observes, that "if horrid symptoms could establish the fact of malignity, there is not to be found in all nosology a more malignant disease, than this; but, aneurism, though it destroys the thigh-bone, the sternum, or the cranium, is not accounted malignant; neither is polypus malignant, though it destroys the cells of the face, and penetrates even through the ethmoid bone to the brain. These consequences result merely from pressure." (*John Bell's Principles of Surgery, Vol.* 3. *part* 1, *p.* 90—92.)

The celebrated professor Richter has also denied the validity of the objections, urged by Pott against attempting to relieve the patient: neither the malignant nature of a polypus, its adhesions, immoveableness, ulcerations, nor disposition to hemorrhage, &c. are, according to Richter, any apology for leaving the disease to itself. (See *Anfangsgr. der Wundarzn. Band.* 1. *Cap.* 21.)

Mr. J. Bell refutes the common notions, that polypi may be caused by picking the nose, blowing it too forcibly, colds, and local injuries. He asserts, that a polypus is not in general a local, solitary tumour: he has only found it so in three, or four instances. Both nostrils are usually affected. He states, that no finger can reach that part of the nostril, where the root of the swelling is situated, as it is deep and high in the nostrils, towards the throat, and near the opening of the eustachian tube. The finger cannot be introduced further, than the cartilaginous wing of the nose extends, and can hardly touch the anterior point of the lower spongy bone. The anterior and posterior chambers of the nostril are separated from each other by a narrow slit, which the finger can never pass, and which is divided, in consequence of the projection of the lower spongy bone, into two openings, one above, the other be-

low. Through these the heads of the polypus project. These tangible parts of the tumour, however, are very distant from its root, which is in the highest and narrowest part of the nostril. (See p. 103, 104.) Mr. J. Bell also says, that three, or four polypi ar eoften crowded together in one nostril, while more are formed, or forming, in the other.

He dwells upon the difficulty and impracticableness of tying the root of a polypus; and explains, that in all attempts to extirpate such tumours, the surgeon's aim should be to reach a point, nearly under the socket of the eye, in the deepest and highest part of the nostrils, and that instruments can only do good when introduced beyond the narrow cleft, formed by the projection of the spongy bone. (P. 108.)

Though Mr. John Bell is probably right in his opinion, that polypi do not proceed from several circumstances, which we have above noticed, yet they are, in most instances, diseases of an entirely local nature. Certainly, in general, it is very difficult to decide what is the cause of the polypus nasi. Frequently the patient is, in other respects, perfectly well; and, after the removal of the tumour, no new one makes its appearance. In this circumstance, it must originate from a local cause, though it is generally difficult to define what the nature of this is. Sometimes several catarrhal symptoms precede the polypus, and, perhaps, constitute its cause. It is possible, they may only be an effect of the same cause which gives birth to the tumour; but, no doubt, they are sometimes the effect of the polypus itself. It is often certain, that a faulty state of the constitution contributes to the disease; for, several polypi frequentlygrow in both nostrils, and even in other situations at the same time; are reproduced immediately after their removal; and the patient often has an unhealthy appearance. Notwithstanding it has been asserted, that a solution of sal ammoniac, frequently injected into the nose, sometimes disperses polypi, the efficacy of the remedy remains unestablished by experience; as, indeed, the very nature of the disease might lead one to anticipate. Some kind of operation affords the only rational chance of a cure.

There are four modes of extirpating a nasal polypus: viz. extracting it with forceps; tying it with a ligature; cutting it out; and destroying it with caustic.

EXTRACTION.

I suspect there mu st be some inaccuracy in Mr. John Bell's account of the little space there is in the nostril, for the introduction of instruments; for, were his description correct, how could such large forceps be introduced deeply into the nostrils, as we see done every day? This gentleman seems to have forgotten, for a moment, how much the parts are expanded, and widened by the tumour.

Extraction is the most common and proper method. It is performed with the ordinary polypus forceps, the blades of which have holes in them, and are internally rather rough, in order that they may take hold of the tumour more firmly, and not easily slip off it. The front edge of each blade must not be too thin and sharp, lest, with its fellow, it should pinch off a portion of the polypus. The forceps must necessarily have a certain breadth: for, when they are too small, they cannot properly take hold of and twist the tumour. When the handles are rather long, the instrument may be more firmly closed, and more conveniently twisted.

However, the forceps are not applicable to all cases. The anterior part of the polypus, lying in the nostril, distending, and, totally obstructing it, is sometimes quite hard; and, when the forceps are introduced, it presses their blades in such a manner, from each other, as it lies between them, that the instrument cannot be introduced sufficiently far, to take hold of the tumour at a proper depth. If introduced to a proper distance, it cannot be closed. In such a case, says Richter, one might, perhaps, advantageously make use of a pair of forceps which may be separated, and put together again at the joint, and the blades of which diverge from each other behind the joint, and touch again at their extremities. After separating the two pieces, their blades are to be separately introduced, and then joined together again at the joint. The anterior indurated portion of the polypus lies in the interspace, and does not prevent the closure of the instrument.

It is generally deemed of importance to take hold of the polypus with the forceps close to its root; and, indeed, when this rule is observed, the whole of the polypus, together with its root, is commonly extracted, and there is less reason to apprehend hemorrhage, which is naturally more profuse when the polypus is broken at the thick, middle portion of its body. It is also a rule, frequently easy of observance, especially when the polypus is not too large. But, in many instances, the tumour is so large, and the nostril so completely occupied by it, that it is impracticable to get hold of its root. In this circumstance, it is often altogether impossible to discover even where the root lies. Here we must be content to

take hold of the polypus as high as possible. The consequences are of two kinds. The tumour sometimes gives way at its root, though it be only taken hold of at its anterior part; and, in other cases, breaks where it is grasped, a portion being left behind, and a profuse hemorrhage ensuing. This is, however, void of danger, if the surgeon loses no time in endeavouring to suppress the effusion of blood; but immediately introduces the forceps again, grasps the remnant piece, and extracts it. The most infallible method of diminishing the bleeding, is to extract what remains behind at its root. In this way, a large polypus is frequently extracted, piecemeal, without any particular loss of blood.

After the polypus has been propelled as far forward, into the nostril, as it can be by blowing strongly through the nose, its anterior part is to be taken hold of by a small pair of common forceps, held in the left hand; and is to be drawn gradually and slowly out, to make room for the introduction of the polypus forceps into the nostril. The more slowly we proceed in this manœuvre, the more the polypus is elongated, the narrower it becomes, the greater is the space in the nostril for the introduction of the polypus forceps, and the higher can this instrument grasp the tumour. After it has taken hold of the polypus as high as possible, it is to be twisted slowly round, and, at the same time, pulled outward, till the tumour breaks. It is a very important maxim, rather to twist the instrument than to pull it, and thus, rather to writhe the polypus off, than to drag it out. The longer and more slowly the polypus forceps are twisted, the more the part where the excrescence separates, is bruised, the less is the danger of hemorrhage, and the more certainly does the tumour break at its thinnest part, or root. When the extraction is done with violence, and celerity, only a piece is usually brought away, and we run hazard of occasioning a copious bleeding.

As soon as the polypus has given way, the surgeon is to examine whether any part remains behind. When the polypus is very narrow at the place where it has been broken, and the patient can breathe through the nose freely, there is reason to presume, that the polypus has given way at its root, and that none continues behind. The finger, if it can be introduced, procures the most certain information; or the probe, when this, for want of room, cannot be employed. The ancients proposed several means for the extirpation of the remaining piece of polypus: but they are, for the most part, objectionable. It is best to introduce the forceps again, under the guidance of the finger, or probe, and thus pinch, and twist off, the part continuing behind.

Hemorrhage invariably succeeds the operation; and it has, by many, been represented as exceedingly perilous and alarming. But, it is not constantly so, and, in many cases, is quite insignificant. Frequently, however, it is really serious; and, as the surgeon can never know beforehand to what extent it will happen, he is always to furnish himself, before the operation, with the most effectual means for its suppression. The danger of hemorrhage may always be lessened, as was before mentioned, by slowly twisting the polypus at its root, in preference to pulling it directly out. When only a portion of the tumour has been extracted, the surest mode of stopping the effusion of blood, is to extract the remaining part without delay. When the polypus has given way at its root, if there should be profuse bleeding, we may first try, ice-cold water, and strong brandy, which may either be sucked or injected into the nose. This single remedy proves effectual in numerous instances. If the hemorrhage should still prevail, it may always be checked with certainty, how copious soever it may be, in the following manner. Roll a considerable piece of lint, as fast as possible, round the extremity of a probe; wet it completely through, with a strong solution of zincum vitriolatum; introduce it into the nostril, and press it as strongly as possible against the part whence the blood issues. When the nostril is very much dilated, the fingers may be used, for this purpose, with more advantage than the probe. The point, from which the blood is effused, may easily be ascertained, by asking the patient at what part of the nostril he experienced the most pain in the operation; and then pressing the finger on various points in this situation. As soon as the blood ceases to flow, we may conclude, that the finger is on the situation of the hemorrhage. This method is so efficacious, that there is seldom occasion for any other. When the bleeding point lies deeply in the nostril, it might be difficult to reach it with the finger. At all events, we may then employ the plan, which some so strongly praise in urgent cases.

A piece of cat-gut may be introduced into the nostril, and, by means of a pair of forceps, be brought out of the mouth. A roll of lint is then to be attached to it, and drawn through the mouth into the nose; thus the posterior aperture of the nostril may be stopped up. Then the nostril in front, is to be filled with a sufficient quantity of lint, moistened in the solution of zincum vitriolatum.

The objections to extracting some polypi, says Richter, have been much exagge-

rated. When the polypus is so large, that its root cannot be got at, its anterior part is to be taken hold of, and the tumour extracted piecemeal. It has already been noticed, that this practice is free from danger. Experience does not prove, that the polypus, which often bleeds profusely, is apt to occasion a violent hemorrhage in the operation; and, even if it should do so, powerful measures may be adopted for the stoppage of the bleeding. The malignity, and ulcerations, attending a polypus, are no objections to the operation; but, are rather motives for its being promptly performed, as delay must occasion more manifest and urgent danger. If the polypus should be here and there adherent to the membrane investing the nostrils, it is proper to separate it, before the operation. This object cannot be accomplished by straight inflexible instruments, such as have been invented by various surgeons. It may be very conveniently done, according to Richter, with thin, long, flat pieces of tortoise-shell, introduced as deeply as possible into the nostril, on every side of the polypus. As it can seldom be known with certainty, *à priori*, that adhesions are not present, it is proper, whenever the tumour is large, to introduce these instruments before the operation.

Sometimes, the greatest part of the polypus extends backward, hanging down behind the palatum molle, towards the pharynx. If there should be but little of the polypus visible in the nostril, its extraction must be performed backward, in the throat. This is usually done with a pair of curved polypus forceps, which are to be introduced through the mouth, in order to seize and tear off the tumour as high as possible above the soft palate. Care must be taken not to irritate the root of the tongue, or else a vomiting is produced, which disturbs the operation. When the polypus cannot be properly taken hold of, we may, according to the advice of some surgeons, divide the soft palate. But this is very rarely necessary. As, by this mode, the polypus is not twisted, but pulled away, the hemorrhage is, in general, rather copious. If a fragment of the tumour should remain behind, it may commonly be extracted through the nose.

Some recommend, for the extraction of polypi in the throat, a ring, consisting of two semicircular portions, with a kind of groove externally, which are capable of being opened and shut, by being fixed on the ends of an instrument constructed like forceps. A ligature is to be placed round the ring, and its end is to be brought to the handle of the instrument, and held with it in the hand. The instrument is to be introduced into the mouth, under the polypus, and expanded as much as the size of the tumour requires. Its ring is then to be carried upward, over the polypus, so as to embrace it; and afterwards is to be shut, whereby the noose after being carried upward, is disengaged from the ring. The noose is to be pushed as high as possible over the tumour, by means of forceps, and the extremity of the packthread is then to be drawn, so as to apply the noose tightly round the polypus. When this is done, the ring of the instrument is to be turned round, firmly closed, and placed in front of the polypus, on the noose, in such a way, that the packthread is to lie between two little pegs, made for the purpose, at the ends of the ring. On drawing the packthread firmly, and pressing the instrument, at the same time, downward, so as to make it act like a lever, the polypus, in general, easily breaks. Another peg projects in the direction of the ring, so as to prevent the ligature from insinuating itself within the circle. (See *Theden's Bemerk. Part* 2. *and Plate* 6. *fig.* 1. *in Richter's Anfangsgr.*)

The employment of this instrument, however, is attended, says Richter, with many difficulties, and little advantage. Polypi in the throat are most conveniently extracted by the ordinary straight polypus forceps, with which they may be seized, and gradually drawn out through the mouth. The tumour generally allows itself to be drawn out without trouble, and the inclination to vomit, which at this moment occurs, also contributes to propel it outward. When it is so stretched, that it cannot be drawn out further, without considerable force, a spatula is to be introduced into the mouth, and to be carried as high as possible behind the polypus, in order to press it downward, toward the root of the tongue. When the tumour is, at the same time, forcibly pulled outward by the forceps, it usually gives way.

When the polypus is situated partly in the throat and partly in the nostril, though it admits of being extracted, in the same way, through the mouth, yet its anterior part often continues attached, and must afterwards be separately removed through the nostril. It is also frequently advisable to twist off the anterior portion of the polypus first, by which, the mass in the throat is often rendered so loose, that it can be easily extracted. Whenever it is conjectured, that the polypus will come away in two pieces, it is always preferable first, to extract the part in the nostril, and afterwards that in the throat: because, the separation of the last is constantly productive of more bleeding, than the removal of the first. Sometimes, the following plan succeeds in detaching the whole polypus at once. Both the part in the nostril, and that in the throat, are to be firmly taken hold of with the forceps, and drawn at first gently, and then more for-

cibly, backward and forward. By such repeated movements, the root is not unfrequently broken, and the whole polypus brought away from the mouth.

Frequently the polypus grows again. Policy requires that the patient should be apprised of this before-hand. Some of the root remaining behind, may often be a cause of the relapse. Hence, the surgeon should examine carefully, after the operation, the part at which the root of the polypus was situated, and separate, and twist off, most diligently, with the forceps, any fragments that may still continue attached. The recurrence of the disease, however, may arise from other causes. The tumour is occasionally reproduced, after it has been extracted in the most complete manner; and, doubtless, this circumstance is sometimes owing to the continued agency of constitutional causes, which so often remain undiscovered and unremoved. Sometimes, also, the recurrence of the disease is owing to a local morbid affection of the Schneiderian membrane, or of the bones situated beneath the root of the polypus. Richter, in this case, approves of the cautery; but few English surgeons will coincide with him. The polypus, occasionally observed subsequently to the operation, is frequently not, in fact, a new substance, but only a part of the original tumour, not previously noticed by the surgeon. Sometimes it occurs, that a smaller and a larger polypus are found in the nose at the same time. The larger one is extracted, while the other remains undiscovered; and, when it has increased in magnitude, it is apt to be mistaken for a reproduction of the one previously extirpated. (See *Richter's Anfangsgr. der Wundarzn. Band.* 1. *Cap.* 21.)

LIGATURE.

As the extraction of the polypus is invariably attended with hemorrhage, which is sometimes profuse, another more modern method of cure has, with some, gained the preference, as being far more convenient and secure. This is, tying the root of the tumour with a ligature, by which the polypus is thrown into the state of inflammation, suppuration, and sphacelus; and, at length, becomes detached. Many instruments have been invented for applying the ligature; but Levret's double cannula seems to be the best. Through this, a silver wire is to be introduced, so as to form a noose at the upper end of the instrument, proportioned in size to the anterior part of the tumour, situated in the nostril. The two ends of the wire are to hang out of the two lower apertures of the double cannula; and one of them is to be fastened to a small ring on its own side of the instrument. The other is to remain loose. The wire must be made of the purest silver, and ought to be as flexible as possible, that it may not readily break. It must, also, not be too thin, lest it should cut through the root of the polypus. The cannula is to be somewhat less than five inches long. By the assistance of this cannula, the noose is to be introduced into the nose, and put round the polypus. But, as the cannula, which is usually constructed of silver, is straight and inflexible, while the inner surface of the nostril is preternaturally arched, especially when much distended by the polypus, it is easy to discern that its introduction must be attended with considerable difficulty. In fact, it can seldom be introduced as deep as the root of the polypus. There are two ways of avoiding this obstacle. The cannula may either be passed under the polypus, over the ossa palati, which present a tolerably straight surface, or it must be curved a little. Perhaps, a tortoise-shell cannula, says Richter, might be convenient.

The noose is to be applied in the following manner. The polypus is to be taken hold of with the forceps, and drawn a little out of the nose. The noose is then to be carried over the forceps and polypus, into the nostril. In order to carry it as high as possible, it is necessary not to push the cannula straight forwards into the nose, but to move it from one side of the polypus to the other. The more deeply the instrument has entered the nose, the more of the loose end of the wire must be drawn out of the lower aperture of the cannula, so as to contract the noose, which otherwise, might stop in the nostril, and not be carried sufficiently high. The elasticity of the silver wire tends to assist in raising it over the polypus, and, hence, it is more easy of application than a more flaccid kind of ligature. When there is cause to conclude, that the polypus is complicated with adhesions, they must be previously broken, in the way already mentioned.

As soon as the noose has been introduced as deeply as possible, the loose extremity of the wire is to be drawn out of the lower aperture of the cannula, and rolled round the ring on that side of the instrument. Thus the root of the polypus suffers constriction. The wire must not be pulled too forcibly, nor yet too feebly. In the first circumstance, it readily cuts through the root of the polypus; in the second, great tumefaction of the excrescence, and many inconveniences arise, which a tenser state of the wire prevents. As the noose gradually makes a furrow, where it surrounds the polypus, it grows slack, after a short time, and no longer constricts the tumour. One end of the wire, therefore, is to be daily unfastened, and drawn more tightly. The more tense

it is kept, the sooner the separation of the polypus is brought about. Hence, when it is particularly indicated to produce a speedy detachment of the polypus, the wire should be tightened, at least, once a-day.

In this manner the cannula is to remain in the nose, until the noose is detached, together with the polypus. There is another method of tying the tumour, without leaving the cannula in the nose. After the noose has been introduced as far as possible into the nostril, the two ends of the wire are to be twisted round the two rings, and the cannula is to be turned round a couple of times. The wire is then to be unfastened from the rings, and the cannula withdrawn. In this way, the noose is made to embrace the polypus, round which it remains fastly applied. Whenever it is wished to produce a greater constriction, the cannula may be again introduced into the nose, the ends of the wire fastened to the rings, and the instrument turned round again; after which, it is to be taken away, as before. As the cannula, when it continues long in the nose, may occasion pain, and other inconveniences, the last method seems preferable to the former. However, introducing and withdrawing the cannula every day, as Richter adds, may, perhaps, be equally troublesome and painful. The cannula, for this purpose, being necessarily straight, is by no means handy. One might, at all events, make use of a single cannula, the upper opening of which is divided by a bridge; this could be much more conveniently twisted than a double one.

Although the ligature has been very much praised by some of the moderns, it is attended with so many difficulties, that the forceps are infinitely preferable in the majority of cases. Hemorrhage is the only inconvenience, for which extraction is abandoned for the employment of the ligature. But this, as was before stated, is far less dangerous, than is represented. The inconveniences of the ligature are far more serious, and numerous. The cure by the ligature is always accomplished with much less expedition than by extraction. When the polypus is of such a size as to occupy the whole of the nostril, it is generally impracticable to introduce the noose to a sufficient depth. The figure of the polypus renders it almost impossible to tie its root; for, commonly, the tumour expands very much before and behind, and the wire must be brought over the posterior part of the polypus, ere it can be applied to its root. In general, also, the noose only includes the front part of the polypus, while the root, and back portion remain untied, and, consequently, do not become detached.—It is, indeed, asserted, that the ligature, when only applied to the front part of the polypus, is capable of bringing about inflammation, suppuration, and a detachment of the whole of the tumour. This may sometimes be the case; but, analogous instances prove, that it is undoubtedly not constantly so. The ligature seldom accomplishes an entire destruction of the disease; and there is usually reason to apprehend its recurrence. If the polypus be very large, and the whole nostril occupied, it is frequently utterly impossible to introduce the wire; and, when this is done, the front of the tumour alone can be tied.

The polypus nasi is commonly very sensible, and, consequently, tying it proves very painful. As soon as the noose is drawn tight, not only the polypus inflames, but, the whole extent of the Schneiderian membrane. The pain, and inflammation, often extend even to parts at some distance, such as the throat, eyes, &c. occasioning acute fever, which requires the strict observance of low diet, the exhibition of cooling physic, and the evacuation of blood. Hence, it is advisable in many cases, to prepare patients for this treatment, by diet and medicines.

When the polypus is tied, it swells very much, and all the complaints it previously caused are exasperated. But, in particular, the part situated in the throat, sometimes obstructs deglutition, and respiration, in such a degree, that prompt relief becomes necessary. The patient soon derives comfort, when a few punctures are made into the tumour. These excite a bleeding, that very speedily lessens the swelling, but is, sometimes, difficult to check. Hemorrhage from a part of the polypus that is tied, is most effectually stopped, by twisting the wire so tight, that it closes the arteries distributed to it.

The wire sometimes breaks off close to the lower aperture of the cannula, in consequence of being twisted so much, and thus the progress of the cure is interrupted. A new wire may be introduced; but it is difficult to apply it exactly in the situation of the other. A fresh place is commonly tied, which is almost the same thing as commencing the cure anew. It is better to prevent this interruption of the treatment, by employing very flexible wire, made of the purest silver; and by not twisting and untwisting regularly the same extremity of it, but sometimes one and sometimes the other. A strong piece of cat-gut might be a very good substitute for silver wire.

Immediately the polypus is tied, it swells, inflames, and becomes painful; in a few days, it becomes shrunk, free from pain, and sphacelated. The fetid discharge now occasions considerable inconvenience to the patient, and ought to be washed away by repeated injections. To-

wards the termination of the case, the surgeon ought to take hold of the polypus with the forceps, to try whether any of it is loose. When the polypus is extracted, one may inject a solution of alum, for a day or two afterwards, in order to diminish the effect of the irritating discharge on the Schneiderian membrane, and the suppuration in the situation of the ligature, as it is sometimes profuse, and of long duration.

Though one might also tie polypous tumours in the throat; and, indeed, the introduction of the cannula through the mouth, and the application of the noose, would be attended with no great difficulty; and, though the treatment might be rendered more tolerable to the patient, by withdrawing the cannula after twisting the wire; yet, the swelling of the tied portion of the tumour, would, probably, create immense inconvenience. In this case, therefore, extraction usually merits the preference, and the ligature is only fit to be practised in the throat when the polypus is very small, or there is some especial cause forbidding extraction. When deglutition and respiration are impeded by the swelling of the tied portion of the polypus in the throat, the swollen part must be scarified by means of the pharyngotomus, so as to excite a bleeding, and, thereby, produce a diminution of the swelling. The noose is to be frequently and strongly tightened, in order to accelerate the detachment of the polypus, and shorten the inconveniences. When the excrescence has not only descended towards the pharynx, but also into the nostril, its front portion is to be tied first. The result of this may be, such an inflammation and suppuration of the whole polypus, that, after the separation of its anterior portion, the posterior one may also become detached, or at least, easy of removal.

CAUSTICS.

The cautery, formerly recommended for the cure of the polypus nasi, is now almost entirely rejected, and, indeed, in the manner it was customary to use it, little good could be done. It was applied to the anterior surface of the tumour in the nostril, and its employment was repeated every time the slough separated. Its operation could naturally be but of small extent, as it only came into contact with a trivial portion of polypus. Its irritation augmented the determination of blood to the excrescence, and accelerated its growth; while as much of the tumour was reproduced, ere the slough separated, as was thus destroyed; and the design of completely extirpating the disease, in this way, seldom or never proved successful. However, says Richter, there is one particular example, where the cautery is the only means from which relief can be derived; and, used in a certain way, it always speedily produces the desired effect.

There are polypi of the nose, which readily bleed profusely. Touching them in the gentlest manner, and every trivial concussion of the body, give rise to hemorrhage. The patient is exceedingly debilitated by repeated loss of blood; his countenance is pallid; his feet swollen; he is affected with hectic fever; and faints whenever there is any considerable bleeding. Doubtless, extraction, in this case, is a very precarious method, as the patient is so circumstanced, that any copious effusion of blood must be highly perilous. Sometimes the polypus is, at the same time, so large, and the nostril so completely occupied and distended, that it is impossible to apply a ligature. Such is the case, to which alone the cautery promises assistance. (*Richter.*)

In employing the cautery, (says the latter author,) the object is not to effect, by its direct agency, a gradual destruction of the polypus; but to excite such an inflammation, and suppuration, of the whole of it, as shall lead to this event. To fulfil this purpose, a common trocar, three inches long, may be used. The cannula ought to be two inches shorter than the trocar, whereby the latter may protrude from it so far; and it should be constructed with a handle. The cannula should be made wider than it is in common, to allow the trocar to be introduced, and withdrawn with facility. It is to be wrapt round with a piece of wet linen, and applied to the polypus. The red-hot trocar is then to be pushed into the tumour, as far as the cannula will allow it, which is, of course, two inches.

According to Richter, this method of treatment is far less painful than it has the semblance of being. It is only necessary to dry the front part of the nostril, and fill it with lint all round the cannula, in order that any moisture, heated during the operation, may not touch, and injure the inner surface of the nose. If care be taken to introduce the trocar in a proper direction, there is no reason to fear damaging the septum nasi, especially as it is preternaturally distended by the polypus. The immediate effect of the operation is to bring on an inflammation and swelling of the whole polypus, frequently accompanied with head-ach, sore throat, fever, and other complaints, which require the antiphlogistic treatment; but, on the whole, are not dangerous.

When the patient entertains a dread of the actual cautery, one might, at all events,

employ the potential one, in various forms. One might introduce into the puncture of the unheated trocar, a tent of the emplastrum cantharidum, or a tent smeared with butter of antimony, which may be allowed to continue in for some time. But, these applications operate slowly, and are hardly capable of exciting inflammation of the whole polypus.

As soon as suppuration has taken place, emollient and detergent lotions should be injected into the nose; cleanliness, and the promotion of the suppurative process, demand them. It is only requisite to maintain suppuration, until the polypus is so small, that it can be conveniently extracted, or tied. To effect its entire destruction by suppuration, is a tedious undertaking. (*Richter's Anfangsgr.*)

EXCISION.

In the treatment of the polypus, the use of cutting instruments has always been reprobated, because they usually occasion a profuse hemorrhage, and can hardly ever be passed, without mischief, to a sufficient depth into the nose to divide the root of the tumour. Yet, there are instances, in which their use might be productive of advantage. The anterior part of the polypus, situated in the nostril, is sometimes so thick and hard, that it is utterly impracticable to introduce the forceps for the performance of extraction, or the cannula for the application of the ligature. In such a case, it might be a judicious step to cut off the front of the polypus, by a sharp instrument, of a suitable shape, in order to make room for the use of the ligature, or forceps. The polypus is sometimes of a ligamentous structure, and neither admits of being tied nor extracted. There is no means of removing such a polypus, except the knife, by which it is to be cut away piecemeal.

Mr. Whately after failing in several attempts to extract, and tie, a considerable polypus of the nose, succeeded in cutting it out. He used "a narrow, straight bistoury, with a probe-joint, having a sheath fixed upon its edge, by a screw put into a hole in the handle. An eye was made at its point, to receive one end of a thread intended to be passed round the polypus, for the purpose of directing the knife to the extremity of the tumour. There was also a contrivance by which the knife could be unsheathed at its extremity, the length of three quarters of an inch. This was done by means of the screw, which might be fixed in another hole, by drawing back the sheath. By exposing such a length of edge only, the interior parts of the nose were defended from the danger of being wounded." Whoever wishes a particular account of the manner of using the instrument, must consult Mr. Whately's *Cases of two extraordinary Polypi, &c.* 1805.

In the polypus, which arises from a relaxation of the Schneiderian membrane, external astringent applications may be first tried; such as ice-cold water, solutions of acetite of lead, alum, muriate of ammonia, &c. These remedies (says Richter) commonly lessen it, and frequently, when it is not very large, accomplish its entire removal. If this should not happen, there is no reason against putting a ligature round it. Here, also, we may venture to employ a cutting instrument, if it be in our power to do so. At all events, an effort may be made to bring on suppuration of the tumour, by the cautery. But, the practice of extraction is here prohibited.

When the Schneiderian membrane is preternaturally swollen all over the nostril, which is quite obstructed, the pervious state of the cavity is to be restored by the introduction of cat-gut, or bougies. A thin piece is first passed into the nose, and afterwards a larger and larger one gradually, until the passage for the air is perfectly re-established. But, usually, this relief is only of short duration, as the nostril very soon closes again. Hence, such patients are advised to make constant use of flexible tubes passed into the nose; or, when this is too troublesome, to fill the nose regularly at bed-time, with cat-gut, and take it out again in the morning. (See *Richter's Anfangsgr. Band.* 1.)

POLYPI OF THE UTERUS.

The polypus of the uterus is of three kinds, in respect to situation. It either grows from the fundus; the inside of the cervix; or from the lower edge of the os uteri. The first case is the most frequent, the last the most uncommon. Polypi of the uterus are always shaped like a pear, and have a thin pedicle. They are almost invariably of that species, which is denominated fleshy, hardly ever being scirrhous, cancerous, or ulcerated.

The polypus of the first kind, growing from the fundus uteri, is very difficult to detect in its incipient state. While it is small, it produces not the smallest perceptible change in the organs of generation. As it enlarges, it distends the uterus, and often excites a suspicion of pregnancy, which a more attentive examination, however, soon disperses. The swelling of the abdomen does not take place in the degree and space of time, which it does in pregnancy; the menstrual discharge continues to flow; the breasts do not become full; and, in the progress of the case, no motion is to be felt. While the polypus lies in the uterus, its growth is slow. It frequently, at this early period, occasions profuse bleeding. Women

afflicted with the disease, are seldom pregnant, and when they are so, parturition commonly happens prematurely. However, it occasionally occurs, that they hold out till the end of the regular time, and experience an easy and safe delivery.

As the polypus encreases, it expands the os uteri, and, at length, protrudes into the vagina. This either takes place suddenly from an accidental concussion of the body; or slowly and gradually. In the latter circumstance, pains similar to those of labour occur, and cause the tumour to be expelled into the vagina. As soon as it has arrived in this situation, and is no longer confined and compressed by the uterus, it begins to grow more rapidly, and gives rise to far more troublesome complaints. It presses the bladder and rectum, and thus, more or less, disturbs the evacuation of the urine and feces. But, in particular, it causes repeated and profuse hemorrhages, which weaken the patient exceedingly, and often bring her to the brink of the grave. The root of the polypus is situated in the os uteri, and is there so compressed, that the blood in the polypus is prevented from returning through the veins; consequently, all the vessels become turgid, and the above effusions of blood are the result. Though they generally cease spontaneously, the least circumstances cause their recurrence; such as slight concussions of the body in riding, walking, &c. In the mean while, a quantity of mucous and aqueous fluid is voided, by which the patient's strength is more reduced. The polypus, the source of this blood and mucus, is frequently misunderstood, and the patient is in a perilous state. So necessary is it in cases of preternatural discharge from the uterus, always to examine with the finger, *per vaginam*.

When the polypus has been for some time in the vagina, it at length protrudes from it externally. This happens gradually or suddenly, on the occurrence of any concussions of the body. Hence, it again excites additional grievances. As it cannot descend so low, without dragging the fundus of the uterus downward with it, and occasioning its prolapsus, the patient, on walking, or standing, commonly experiences a very painful sense of dragging, or stretching, in the pelvis. As the bladder and ureters are also forced into a deranged position, the evacuation of urine is, more or less, disturbed, or rendered difficult. The flow of the urine over the polypus, as well as the irritation of outward friction on it, frequently causes it to inflame, become painful, and ulcerated.

The polypus situated in the vagina, or protruding from it externally, may easily be mistaken for a prolapsus uteri: an error that may have very perilous consequences; but, by a careful examination, is generally not difficult to avoid. The polypus is softer and less sensible, than the uterus in the state of a prolapsus. The imperfect prolapsus uteri, in which this viscus is not turned inside out, is betrayed by the os tincæ, at the lower part of which it is plainly perceptible. In this situation, the polypus may occasionally have a depression, resembling the mouth of the womb, but easy of discrimination from it. A probe can be passed deeply into the os uteri; but, not so into this other opening. The polypus resembles an inverted pear, that is, it is thickest below, and becomes gradually thinner upward. The above species of the prolapsus uteri, is thinnest below, and gradually increases in width upward. The fallen uterus may easily be pressed back, and when it is so, the patient experiences relief. The polypus does not admit of being pressed back, and, during an attempt to do this, the patient is put to much inconvenience. A probe may be introduced by the side of the polypus deeply to the fundus uteri. When passed by the side of the fallen uterus, it is very soon stopped at the upper part of the vagina, which has sunk down with the cervix of this organ.

It is much more easy to distinguish a polypus protruded externally from the vagina, from a perfect prolapsus uteri, without inversion. The os uteri at once characterises the uterus, as it can here not only be felt, but seen. A probe may be passed deeply into the vagina, along the side of the polypus; but, not so by the side of the uterus, for reasons easy of comprehension. Moreover, the figure of the tumour, and the state of the patient, on an effort being made to reduce the protruded part, betray its real nature.

The inversio uteri, is commonly the consequence of a difficult labour, and hence is easily discriminated from a polypus, by its occasional cause. While the inverted uterus lies in the vagina, its shape is broad above, and narrow below; whereas the polypus is thin above, and broad below. Hence, in cases of very large polypi in the vagina, the os uteri is but little dilated; while it is extremely distended by the incomplete descent of the inverted uterus itself. Here, likewise, the reduction of the part is attended with relief; while every effort to push back a polypus causes an aggravation of all the complaints.

When the inverted uterus hangs out of the vagina, its figure, like that of the polypus, is thin upward, and broad downward; and, like the latter tumour, has no aperture at its lowest part. Here, an erroneous opinion is very liable to be formed. An attentive observer, however, will easily avoid it. The inverted uterus includes a circular fold at its up-

per part, next to the orifice of the vagina. This fold is nothing less than the os uteri itself, through which the body of this viscus has descended. There is nothing of this kind to be felt in cases of polypi. By the side of a polypus the finger or probe may be passed deeply into the vagina; but not so by the side of the uterus. The root of the polypus is firm and hard to the touch; the upper thin part of the uterus, which is hollow, has a soft flabby feel. Useful light is also generally thrown on the case, by the abovementioned occasional cause of the prolapsus uteri with inversion.

In the two last descriptions of uterine polypi, which are situated either on the inside of the cervix, or at the margin of the os uteri, the disease is, as it were, from its commencement in the vagina, and the tumour, when large, produces all the complaints attending polypi of the first kind, except frequent profuse bleedings. These seldom occur, and when they do, are slight, because the root of the polypus suffers no constriction in the os uteri. As it descends out of the vagina, it occasions a prolapsus uteri without inversion, in addition to the other inconveniences.

TREATMENT OF POLYPI OF THE UTERUS.

Experience evinces, that uterine polypi, when once extirpated, have not that propensity to be re-produced, which those of the nose have. Extraction is not fit to be practised here for obvious reasons. Sometimes, however, uterine polypi are met with, which have such a thin and soft pedicle, that although they ought not to be pulled out, yet they admit of being twisted off with facility and safety. Also, numerous complaints of a serious nature, are occasionally the result of tying a polypus of the uterus. In this circumstance, after the ligature has been applied some days, we may attempt to shorten such complaints, by twisting off the tumour altogether. This object is most conveniently performed with a pair of forceps, made something like Smellie's midwifery forceps. As the part of the polypus in the ligature is constricted, thin, and already partly detached, the tumour, with a little caution, may frequently be easily twisted off, and that without any material bleeding. The actual and potential cautery, are here unnecessary, as there is always room to employ the instruments for applying the ligature.

The ligature is the most proper means of extirpating uterine polypi, and is here much more easy of application, than in the nose. How large soever the polypus may be, there is always abundance of room for the introduction of the necessary instruments. The polypus of the uterus has, commonly, a thinner pedicle, than that of the nose; and, hence, its cure by the ligature is more expeditious, than that of the latter case. The swelling of the tumour, after the ligature is applied, occasions here far less inconvenience, than in the nose, on account of the greater room, and more yielding nature of the parts. The inconveniences that do arise, are easy of removal; for instance, the retention of urine may be relieved by the catheter: costiveness by glysters, &c. Uterine polypi are also less sensible, than nasal ones; and, hence, less pain and fever follow the application of a ligature to them. The fetid matter, that forms as soon as the polypus sphacelates, has a free vent out, and may easily be washed away by injections.

That the polypus cannot be tied, while it lies in the uterus, is easily comprehensible. But, immediately it has descended into the vagina, the operation may be undertaken, and may be performed with the same kind of double cannula, as was employed in the nose. However, here it is extremely requisite, that the cannula should be rather longer, than that already described, and somewhat curved. But, as the silver wire sometimes breaks, two other very convenient instruments have been invented.

The first is M. Levret's instrument. It consists of two silver cannulæ, which are curved in such a manner, and so united by a joint, that they are shaped like a pair of forceps. After introducing a ligature through the two tubes, so that its ends hang out of their lower apertures, the instrument is to be shut, and passed upward into the vagina, over the polypus, on whichever side seems most convenient. Then it is to be opened, and the polypus is to be pushed through the two branches of the instrument, which is to be brought over the opposite side of the tumour. In doing this, the ligature becomes applied round the root of the polypus, and forms a noose. The extremities of the ligature are next to be drawn as tightly as possible out of the lower openings of the cannulæ, and tied first in a surgical knot, and then in a slip-knot. When this is done, the instrument is shut, and the ligature constricts the root of the polypus. Afterwards it is to be tightened daily, until the tumour separates.

It is plain, that this instrument has some defects, which are, however, easily amended. It is very inconvenient, that it should be necessary for the surgeon to have several such instruments, of various sizes, and curvatures, to be able to select that, which seems most calculated for the magnitude and shape of the polypus.

Moreover, as the size and figure of the polypus cannot always be ascertained beforehand, it is often indispensable to try several instruments, ere the most suitable one is found out, and such fruitless attempts must be very irksome and painful to the patient. The worst is, that though the upper ends of the instrument were to touch, when the lower are tied together, yet there would always be a space between the two apertures, where no ligature would be applied to the root of the polypus, and where, consequently, its separation would not easily be accomplished. The tubes may, also, bend with the force used in applying them, and the pain caused by the expansion of the instrument, would then be very considerably increased.

All these defects are done away in the instrument described by Nissen, *de polypis uteri*, (*See Richter's Chir. Bibl.* 9. *B. S.* 613.) It consists of two silver tubes, twelve inches in length, and as thick as an ordinary writing pen. Both are curved about as much as the os sacrum; but, as they are made of pure silver, the curvature may easily be increased or diminished, according to circumstances. Through each of the cannulæ a strong ligature is to be passed, so that its ends hang out of the lower apertures, while its middle portion forms a noose between the upper apertures of the cannulæ.

The tubes are to be kept together, until they have been introduced into the vagina, as far as the root of the polypus. One is then to be held fast, while the other is to be carried round the tumour, to the opposite side of the cannulæ that remains stationary. Thus the ligature becomes applied round the root of the polypus. After introducing the finger into the vagina, to ascertain that the ligature lies in its proper situation, its ends are to be drawn through a small double cannula, which is only one third of an inch long, but so wide that it can be pushed over both the tubes a certain way with the finger, and the upper end of the long cannulæ with the aid of a sort of long probe, with a forked extremity. Then a third double cannula, through which the ends of the ligatures have likewise been passed, and the width of which is sufficient, is to be pushed over the lower ends of the long cannulæ, so as to unite them. The ligatures are next to be drawn tight in the ordinary way, and fastened to the rings. The management of this instrument is so easy, as to need no further explanation.

This instrument is certainly far superior to any one commonly used in this country. It is difficult to pronounce, whether its simplicity; aptness for the object intended; or, the facility of using it; lays the greatest claim to our commendations. The same reasons, which recommend its employment in polypi of the uterus, equally point out the advantage of having an instrument, constructed on the same principle, for tying nasal ones.

Besides the above instruments, there are numerous other ones, that have been devised, and recommended for tying polypi of the uterus. That, invented by Desault, claims the attention of such surgeons, as wish to be informed of others.

Acute symptoms frequently follow the application of the ligature, and are either of an inflammatory, or spasmodic kind. The former require antiphlogistic treatment. Sometimes, a fever arises, and the polypus becomes exceedingly painful: in this case, venesection is often necessary. The spasmodic symptoms require the exhibition of opium. When this is ineffectual, and the symptoms are severe, it may be proper to slacken the ligature a little. As the polypus at first always swells, it produces great pressure on the adjacent parts. For this reason, it is generally necessary, for the first few days, to draw off the urine with the catheter, and to open the bowels with glysters. Sometimes hemorrhage takes place. This is generally suppressed by astringents; but, when they prove ineffectual, tying the ligature more tightly answers the purpose. The rest of the treatment resembles that of nasal polypi.

When the polypus is large, forceps are, in the end, often necessary for its extraction. The inflammation, or ulceration, that may possibly be occasioned in the vagina by the fetid matter, is easily removed by injections after the detachment of the polypus. As the ligature is always applied round the pedicle, closely to the os uteri, consequently seldom to the root of the polypus, which is usually at the fundus uteri, there is almost always a portion of the root remaining behind, after the tumour has separated. Though it is said, that this afterwards diminishes, and falls off; yet, it is quite a matter of uncertainty. But, it is an undoubted fact, that the polypus uteri is exceedingly seldom reproduced. (*Richter.*)

This author observes, that cutting instruments are, in general, improper to be used for polypi of the uterus, as their employment would injure the vagina, and, for the most part, occasion a dangerous hemorrhage. There is, however, one case, where the knife is indispensable. The polypus has occasionally a ligamentous pedicle, and consequently can neither be tied, nor extracted. This circumstance is usually undiscovered till after a ligature has been applied, which here commonly produces extraordinary pain, and, though

it be applied ever so long, and forcibly, occasions no detachment of the polypus. In this instance, the surgeon has the choice of two plans. He may either cut off the polypus closely to its root in the vagina; or he may first draw it gradually downward out of this situation. The first object might, perhaps, be performed with a sharp hook, somewhat curved at its side, and similar to what is used for tearing the fœtus piecemeal in the uterus; or, with what seems better, a pair of long, curved, blunt-pointed scissars. The last object may be accomplished with forceps resembling Smellie's midwifery ones. They are to be introduced into the vagina in the ordinary way. The polypus is then to be taken hold of, and gradually drawn so far out of the vagina, that its pedicle may be divided with a knife. This is, indeed, not done without pain, and a forcible inversion of the uterus; but, it is always free from dangerous consequences. When a polypus, the root of which is attached to the fundus uteri, lies in the vagina, the uterus is always, in some degree, inverted beforehand; and this state is, therefore, only increased by the foregoing plan, which never creates danger, when done slowly, and cautiously. How often has the uterus been suddenly inverted, and forced outward, without fatal consequences! Besides, the above plan has already been successfully practised. (See *Herbiniaux, Parallèle des différens Instrumens pour la Ligature des Polypes.*)

When a polypus, that has its pedicle attached to the fundus uteri, suddenly falls downward, it occasions a sudden inversion of this viscus. In order to relieve, as speedily as possible, the great pain, and danger of this case, the surgeon must tie the root of the polypus, as soon, and as firmly as he can, and pass the ligature, by means of a needle, through the pedicle, before the place where it is tied, allowing the ends afterwards to hang down for some length. Then the polypus is to be amputated below the ligature, and the uterus immediately reduced. This is another example, where a cutting instrument may be used with advantage. The ordinary method of tying such tumours, so situated, accomplishes only a slow detachment of them, and is not sufficiently expeditious in procuring relief.

Fleshy excrescences also occasionally form in the vagina, some of which have a broad basis, and others a thin pedicle. The last merit the appellation of polypi. Their existence is easily ascertained by the touch. By making pressure on the bladder, and rectum, they occasion several impediments to the evacuation of the urine, and feces. They may be most conveniently tied, by means of the double cannula. Should the polypus be situated at the lower part of the vagina, the cannulæ would not be required. The ligature might be applied with the hand, and the tumour cut off below it.

There is still another kind of tumour in the vagina, to be classed in the rank of polypi. It resembles, in many points, the polypus of the mucous membrane of the nostril, consisting altogether of the membranous lining of the vagina, which, at the part affected, becomes relaxed, thickened, and elongated; hence, the tumour might more properly be termed a *prolapsus of the membrane lining the vagina*, than a polypus. When it resists the efficacy of astringent and corroborant injections, it may be tied, or, what is better, cut off.

A polypus in the œsophagus renders deglutition difficult; and, when of large size, puts an entire stop to it. When an inclination to vomit is excited by irritating the throat with the finger, or a feather, the polypus, if situated towards the upper part of the tube, ascends into the mouth, so as to become visible. But, as it impedes respiration during its residence in the mouth, the patient is soon necessitated, as it were, to swallow it again. When the polypus is situated at the lower part of the œsophagus, of course, it cannot be brought into the mouth, and is very difficult to detect. The difficulty of swallowing, its only symptom, may result from other causes. In this case, it is also incurable; for, it is impossible to take hold of it with instruments. An operation can only be practised, when the polypus is situated at the upper part of the œsophagus. The tumour obviously cannot be extracted; it can only be tied, and this is difficult. In order to apply the ligature, the excrescence must be first brought into the mouth by exciting an effort to vomit. As this impedes respiration, the operation must be done with the utmost celerity, and the ends of the ligature cut off short, that the patient may immediately swallow the tumour again. It is easy to discern, that in this way, the ligature is never applied sufficiently close to the root of the polypus, nor tightly enough; consequently, the separation of the tied portion either does not take place at all, or very slowly; and a large part commonly remains behind, which soon attains its former bulk, and causes its preceding inconveniences. Perhaps, the operation might be performed with more exactness, and success, if an opening were previously made into the trachea by bronchotomy. Then the patient might breathe through the aperture; the polypus might continue in the mouth during the whole cure, until detached; and, perhaps, might be tied close to its root, by means of a

curved tube. Experience (adds Richter) must decide, whether this plan is advantageous, and practicable.

Polypi in the rectum may be felt by the fingers. The first suspicion of them arises from the impediment to the evacuation of the excrement. They are to be tied with the aid of the cannulæ. Excrescences in the meatus auditorius externus, resembling polypi, have been successfully extirpated by extraction; or rather by twisting them off.

For many of the foregoing remarks, I am indebted to Richter, who has very ably treated of polypi in his *Anfangsg. der Wundarzn. Band.* 1, *Kap.* 21. See also *Pott's Remarks on the Polypus of the Nose. Whateley's Two Cases of Extraordinary Polypi. John Bell's Principles of Surgery, Vol.* 3, *Part* 1. *Encyclopédie Méthodique; Art. Polype.*

PROCIDE'NTIA. (from *procido*, to fall down.) A prolapsus, or falling down of any part. (See *Anus, Prolapsus of; Uterus, Prolapsus of, &c.*)

PROGNO'SIS. (from προ, before, and γινωσκω, to know.) A knowledge of the signs, by which we foretel what will happen to the patient.

PROLA'PSUS. (from *prolabor*, to slip down.) A falling down of any part. Same as *Procidentia.*

PROSTATE GLAND, DISEASE OF. According to Mr. Home, the prostate gland is not a very sensible part. Dr. Baillie has seen a common abscess situated in it, and he says, that it is also subject to scrophulous disease, as, on cutting into it, he has met with the same white curdy matter, which is formed in a scrophulous absorbent gland. He has likewise forced out of its ducts scrophulous pus.

The most frequent disease of this part is a scirrhous enlargement of it, when, from its natural size of a chesnut, it becomes as large as the fist. When cut into, it exhibits a very firm whitish, or brown substance, containing membranous septa. Sometimes its external surface is ulcerated, though this is not often the case; and fistulous communications are occasionally formed with the rectum. A considerable enlargement of the prostate gland is attended with great dimculty of voiding the urine, and the muscular coat of the bladder becomes, in consequence of the efforts it has to make, very much thickened. This disease of the prostate gland seldom occurs, except in old men, and is not so common as many suppose. Mr. Home observes, that the morbid enlargement of the gland does not diminish the size of the passage into the bladder, but rather increases it. The lateral portions of the gland as they swell, widen the passage between them, rendering it of an oval form; it is therefore the projecting portion, from the lower part, which prevents the urine from flowing, and obstructs an instrument in its passage into the bladder. The obstruction, in some instances, arises from the two sides of the gland enlarging unequally; the larger portion pressing against the smaller, which is made hollow to receive it, so that the passage winds round the projecting part, and this winding cannot be followed by an instrument.

Mr. Home remarks, that a stricture may be distinguished from an enlargement of the prostate gland, by the following circumstances: the distance of the obstruction from the external orifice is to be determined by passing a soft bougie, which is to be left in the canal for a minute, so as to receive an impression from the obstruction. If the bougie does not pass further than seven inches, and the end is marked by an orifice of a circular form, (it is immaterial as to the size of the orifice,) the disease is certainly a stricture; but, if it passes further on, and the end is blunted, a disease in the prostate gland is to be suspected. This in general can be ascertained by a flexible gum catheter with a stilet, very much curved, passing into the bladder, which it will do, in most cases of enlargement of the gland.

Among the symptoms of a diseased prostate, we have also to mention, a difficulty of voiding the feces; an occasional discharge of a kind of mucus; an uneasy sensation about the rectum, after going to stool, as if more of the feces remained undischarged. The difference between the symptoms of a stone in the bladder, and those arising from disease of the prostate, is explained in the article *Lithotomy.*

The occasional retentions of urine, to which patients with disease of the prostate are subject, require the introduction of the catheter, and the surgeon will succeed in passing this intrument better, when he remembers, that the urethra, in consequence of the disease, makes a very sudden turn upward, just before it terminates in the bladder.

The enlargement of the prostate gland may often be felt by passing a finger into the rectum. Surgeons are unacquainted with any certain mode of diminishing the scirrhous enlargement of the prostate gland. The *pilulæ hydrargyri cum cicutâ* have been recommended. (See *Pilulæ.*) Mr. Home mentions a case, in which suppositories of opium and hemlock, passed up the fundament, and allowed to dissolve there, gave more relief, than any other plan; they not only lessened the irritation, but produced a diminution of the projection of the gland.

Some abscesses, and ulcerations of the

prostate, in consequence of strictures, may be cured, by removing the latter disease.

The prostate gland has occasionally small calculi in its ducts: but, the disease is so uncommon, that authors have not ascertained the particular symptoms, &c. I shall conclude with referring to *Baillie's Morbid Anatomy*; *Home on Strictures, Vol.* 1, *and on Diseases of the Prostate Gland.*

PRURITUS. (from *prurio*, to itch.) A violent itching.

PSEUDOSYPHILIS. (from ψευδης, false, and *Syphylis*, a shepherd, who fed the flocks of King Alcinous, and who, proud of their number and beauty, insulted the Sun; as a punishment for which, the venereal disease was sent on earth; or from σιφλος, filthy.) Disease, resembling the venereal, but not really of this nature. The spurious venereal disease. (See *Venereal Disease.*)

PSOAS ABSCESS. See *Lumbar Abscess.*

PSORA. (from ψαιω, to rub.) The itch, which is attended with a perpetual inclination to rub, or scratch the parts.

PSOROPHTHALMY. (from ψωρα, the itch, and οφθαλμια, an inflammation of the eye.) An inflammation of the eyelids, attended with ulcerations, which itch very much. By psorophthalmy Mr. Ware means a case, in which the inflammation of the eyelids is attended with an ulceration of their edges, upon which a glutinous matter lodges, incrusts, and becomes hard, so that, in sleep, when they have been long in contact, they become so adherent, that they cannot be separated without pain.

Mr. Ware remarks, that "the ulceration in the psorophthalmy is usually confined to the edges of the eyelids; but, sometimes, it is seen to extend over their whole external surface, and even to excoriate the greater part of the cheek. In cases of the latter kind, the inflammation which accompanies, has often much the appearance of an erisypelas, and will receive most relief from cooling applications. The use of the citrine ointment, which will hereafter be recommended, must, in such instances, be deferred until the irritability of the skin is in a good degree abated.

"This disorder is also, sometimes, attended with a contraction of the skin of the lower eyelid; in consequence of which, that lid is drawn down, and the inner part turned outward, so as to form a red, fleshy, and most disagreeable appearance, called ectropium. Whenever this happens, it proves the complaint to be of the most obstinate nature; though it is generally removed by the cure of the psorophthalmy, which is the occasion of it." (*Remarks on Ophthalmy, &c. p.* 112.)

Mr. Ware recommends, for the cure of this disease, the unguentum hydrargyri nitrati. This is to be melted into an oil, and rubbed with the end of the forefinger, or the point of a small pencil-brush, into the edges of the affected eyelids, once every night, on going to bed. A plaster of ceratum album is then put over the eyelids to keep them from adhering together. If they should still adhere in the morning, he advises cleaning them with milk and butter, well mixed together. In a few cases, it is necessary to touch the ulcers, formed on the edge of the eyelid, after the small-pox, with the argentum nitratum. When the globe of the eye is inflamed, use the thebaic tincture, as directed in the article *Ophthalmy.* In scrophulous subjects, alterative medicines; an issue, or perpetual blister; and attention to diet, &c. are proper. (See *Ware on Ophthalmy, &c.*)

PTERYGIUM. (dim. of πτερυξ, a wing.) Scarpa accurately remarks, that surgeons apply the term "*pterygium*" to that preternatural, reddish, ash-coloured, triangular little membrane, which most frequently grows from the internal angle of the eye, near the caruncula lachrymalis, and gradually extends over the cornea, so as to cause considerable impediment to vision.

Though the pterygium most commonly proceeds from the internal angle, it is observed to arise sometimes from the external one, and, in some instances, from the superiour, or inferiour hemisphere of the eye-ball. But, whatever be its origin, its figure is invariably that of a triangle, with its base on the white of the eye, and its apex more or less advanced over the cornea, towards its centre, and that of the pupil. Indeed, there are a few cases, in which two, or three pterygia of different sizes occur on the same eye, and are arranged round its circumference at interspaces of various breadths. Their points are directed towards the centre of the cornea, and if they should unfortunately conjoin there, the whole of that transparent membrane becomes covered with an opaque veil, and a total loss of sight is the consequence. It seems to Scarpa, that the term "*pannus*" was applied by the ancients to exactly this sort of complication.

Strictly speaking, chronic varicous ophthalmy, with relaxation, and thickening of the conjunctiva; opacity of the cornea; and the pterygium; only differ in the degree of the disease. In reality, all the three complaints consist of a more, or less extensive varicous state of the vessels of the conjunctiva, combined with a degree of preternatural relaxation, and thickening, of that membrane.

In chronic varicous ophthalmy, the ex-

traordinary amplitude, and knottiness of the vessels; the flaccidity, and thickening of the conjunctiva; are limited to the white of the eye. In opacity of the cornea, certain veins even dilate, and become knotty, for some way, over that delicate layer of the conjunctiva, which is continued over the surface of the cornea. In the pterygium, an extraordinary swelling of this subtile membranous expansion is added to the varicous state of its veins. Hence, the pterygium seems at first like a new membrane formed on the cornea, while it is really nothing more, than the delicate continuation of the conjunctiva just mentioned, deprived of its transparency, and degenerated, in consequence of chronic ophthalmy, into a thick, opaque membrane, on which there is a plexus of varicous blood-vessels. Consequently, in the case of pterygium, there is no new production on the eye, but only an alteration of one of the thin, transparent membranes, which naturally cover it. The following circumstance, as will be more fully explained presently, illustrates, says Scarpa, the veracity of the preceding statement. The incipient pterygium may be cured in the same manner as opacity of the cornea, viz. by merely cutting off that portion of it, which is situated at the junction of the cornea with the sclerotica, without detaching the whole of it from the surface of the former membrane; just as is practised in opacity of the cornea, in order to destroy the communication of the varicous veins of the conjunctiva with their trunks, the ramifications of which produce, and maintain the disease.

Scarpa observes, that the pterygium would be as common a complaint as the varicous chronic ophthalmy, so often occupying the white of the eye, if the delicate continuation of the conjunctiva, over the surface of the cornea, were not naturally of a denser, and more compact texture, than the rest of the membrane, from which it is produced, and if its vessels were not very minute, and delicate, and not so dilatable as those of the other part of the conjunctiva. This is the reason why the pterygium is comparatively a rare case, in respect to the great frequency of varicous, chronic ophthalmies. But, should the vessels of the transparent layer of the conjunctiva once yield to the impulse of the fluid propelled into them; should they once become varicous; the cellular texture, in which they are enveloped, never fails to swell gradually, and, thus, the delicate, diaphanous membrane in question, changes into a pulpy, reddish tunic, precisely similar to the pterygium.

That the pterygium is truly nothing else but the natural, delicate, transparent expansion of the conjunctiva, on the cornea, converted, for a certain extent, into a pulpy, flaccid varicous membrane, may be inferred, (continues Scarpa) from the folds, which the pterygium and conjunctiva form at the same time, when the morbid eye is turned towards the origin of the disease. The same inference is equally deducible from the tension occasioned in both these parts, whenever the eye is moved in the opposite direction. We become still more convinced of the fact on observing, that in the first position of the eye, both the pterygium, and the corresponding portion of the conjunctiva (which is equally relaxed, varicous, and reddish), may be easily taken hold of with a small pair of forceps, and raised together in the form of a fold.

When the pterygium is met with in the dead subject, on carefully cutting off, and detaching, that flaccid, and thickened portion of the conjunctiva, in the white of the eye, which corresponded to the part of the cornea in the state of opacity from the pterygium, Scarpa has constantly found, that the pterygium might be separated, with equal facility, both on the white of the eye, and the cornea. The latter membrane was evidently denuded at the seat of the disease, being no longer covered with the transparent continuation of the conjunctiva. But, Scarpa has never been able to deprive the cornea of its natural covering, beyond the limits of the pterygium. Also, when several pterygia occur on the same eye, with interspaces between them, as many flaccid, varicous, pulpy places appear in the conjunctiva on the bulb, and constitute the basis of the pterygia; while the rest of this membrane, covering the white of the eye, continues smoothly spread over the ball, and no varicous blood-vessel is perceptible on the anteriour hemisphere of the eye, except where the relaxation of the conjunctiva, and the knottiness of the vessels, have implanted, as it were, the distant roots, and rudiments of the pterygium.

The pterygium, whether large, or small, and whatever its situation may be at the circumference of the eye-ball, constantly retains its triangular shape, with its base on the white of the eye, and its apex on the cornea. The constancy of this fact seems to Scarpa attributable to the increasing degree of firmness, with which the subtile, transparent layer of the conjunctiva adheres to the surface of the cornea, as it proceeds from the circumference to the centre of that membrane. The following consequences must necessarily result from this sort of structure, and the different degree of cohesion, actually existing in healthy eyes. 1. The progress of the pterygium must be slower in every instance on the cornea, than on the white of the eye. 2. As the pterygium always meets with augmented resistance, in pro-

portion as it endeavours to approach the centre of the cornea, it must from mechanical necessity assume the form of a triangle, with its base on the white of the eye, and its apex directed towards the centre of the cornea. Forestus (*Oper. Med.*) has accurately noticed the circumstances of this appearance, and, he continues: *non cooperit oculum nisi in formâ sagittæ.*

From this invariable appearance, and figure of the pterygium, one of its principal diagnostic characters results, by which the true disease may be discriminated from false instances, and from every other soft, fungous, reddish excrescence, that obscures the cornea. For, on this membrane, excrescences sometimes form, which, from having the colour and consistence of a soft membrane, bear a very great resemblance to the pterygium, though they are really widely different, and, strictly speaking, consist of the texture of the cornea itself, degenerated into a soft, fungous substance. Such pellicles, however, not only almost always create a greater prominence on the cornea, than what accompanies the pterygium, but they are constantly of an irregular tuberous form, and never represent a triangle, with the apex pointing towards the centre of the cornea, like the genuine pterygium.

Another distinguishing character of the pterygium (continues Scarpa) consists in the facility, with which the whole of it may be taken hold of with a pair of forceps, and raised into a fold on the cornea. Every other kind of excrescence, attached to this membrane, continues firmly adherent to it, and cannot be folded, and raised from the surface of the cornea, in any manner whatever. This particularity is of the highest importance in the treatment of the disease; for, the genuine pterygium may be cured by simple means, while fungous excrescences of the cornea, can only be radically removed, and perfectly cicatrized with the utmost difficulty. Plenck very properly observes, on this head: *Pterygia, quæ filamentis solummodò adhærent, facilè abscinduntur, difficillimè quæ ubique accreta sunt corneæ, ac in plicam elevari non possunt.* If this excrescence should adhere firmly to the cornea, be of a deep red colour, easily bleed on being touched, and, cause shooting pains in the whole eye, and temple, though it be of a triangular figure, and constitute the true pterygium, it now threatens to assume a malignant cancerous nature, or has done so already. Hence, in the treatment, it is necessary only to adopt a palliative plan, or else extirpate the whole eye-ball.

The true, benign pterygium, says Scarpa, which has a triangular figure, is ash-coloured, or pale-red, is free from pain, and admits of being raised in the form of a fold on the surface of the cornea, may be cured by cutting the opaque triangular little membrane accurately from the surface of the cornea, which is in part covered by it. But, as it appears, from what has been said, that the pterygium is nothing, but a portion of the delicate, transparent layer of the conjunctiva, converted by chronic varicous ophthalmy into a thick, opaque tunic, it follows, that the pterygium cannot be removed in any way, without the spot, which it occupies on the cornea, being bereft of its natural external covering. Also, as this denudation of the cornea renders a cicatrix unavoidable at the place, it equally follows, that the knife cannot be employed in the cure of the disease, without the cornea being rendered more or less opaque at the part, where the pterygium was before situated. Hence, Scarpa cautions young surgeons not to allow themselves to be deceived by the specious accounts of authors, who assert, that they have removed pterygia with the scalpel, and entirely restored to the cornea its former natural transparency. It is true (says he) that, after the removal, and cure, of the pterygium, the cornea at the part affected becomes less opaque, than it was before; but, the place always continues dim, and clouded with an indelible, though a superficial cicatrix. The amendment, derived from the operation, cannot but be considerable; by means of the incision, and firm cicatrix, a stop is put to the progress of the complaint, or rather to the increase of the varicous affection, and swelling, of the thin, transparent layer, of the conjunctiva, situated on the cornea; the local cause of irritation, and inflammation of the eye, is entirely obviated; and, thus, complete opacity of the cornea is prevented. But, should it ever have happened after the recision of a large pterygium, that the patient regained his sight, we are to understand a certain degree of vision; in that proportion (Scarpa wishes to signify) which exists between a dense membrane, which entirely obstructs the passage of the light, and a slight, superficial cicatrix of the cornea, which does not intercept it altogether.

Scarpa's experience enables him to state, however, that the superficial, indelible speck, remaining on the cornea, after the recision of the pterygium, is always less extensive, than the space previously occupied by the disease. This fact, says he, is a constant one, and, in the vast number of pterygia, for which he has operated, some had advanced over the cornea two lines, others two and a half, towards its centre. In all, the scar, and

opacity, of the cornea, diminished after the cure was perfected, and never exceeded a line and a half, or a little more, in cases, in which the pterygia had been two lines in length.

The recision of the pterygium is a very easy operation. For this purpose, there is no occasion for a needle threaded with silk, which most surgeons recommend to be passed through the little membrane, in order to make a noose for raising the pellicle, which must be divided at its base. The plan is disadvantageous, as it prolongs the operation considerably, and, particularly, as the bleeding from the punctures prevents the operator from distinguishing, with the necessary clearness, the margin of the parts designed for removal. A pair of dissecting forceps, and a pair of sharp scissars, suffice for this operation.

It is customary (continues Scarpa) to remove the pterygium by making the incision on the cornea, and extending it over the white of the eye, as far as the base of the disease reaches on the conjunctiva; so that when the pterygium grows from the internal angle of the eye, most surgeons continue the section as far as the caruncule. This practice is disadvantageous, first, because it denudes too much of the white of the eye; secondly, because, in consequence of the large portion of the conjunctiva removed at the base of the pterygium, and, in consequence of the direction of the wound, the cicatrix in the white of the eye, forms an elevated frænum, which, like a little cord, keeps the eye-ball approximated to the caruncula lachrymalis, and destroys the freedom of its motions, particularly, towards the external angle.

To avoid this inconvenience, Scarpa says, he has found it useful, in the treatment of pterygia with bases extending far in the white of the eye, to detach them at their apex, as far as the junction of the cornea with the sclerotica, and then to separate them at their base by a semicircular incision, comprehending one line in breadth of the substance of the conjunctiva, and made in a direction concentrical with the edge of the cornea. Scarpa has observed, that, in this mode of operating, the subsequent cure takes place sooner, than when the common method is adopted; the cicatrix occasions no sort of frænum, and the conjunctiva, circularly stretched by the cicatrix, lies smoothly over the white of the eye, and loses that relaxation, and varicous state, which are the groundwork of the pterygium. Such attention, however, is not requisite, when the pterygium is small, and its base does not extend far in the white of the eye.

Scarpa describes the operation, as follows: The patient being seated, an assistant behind him is to elevate the upper eyelid with the index and middle fingers of one hand, while he depresses the lower eyelid with the corresponding ones of the other. Supposing it the right eye, the operator is to stand, or sit down, just as he prefers, in front of the patient; and the former, after directing the latter to move his eye-ball towards the part corresponding to the base of the pterygium, is to seize the morbid membrane with a pair of forceps held in his left hand, and pinch it into a fold, at about one line from its apex. The duplicature is now to be raised, and drawn out gently until a sensation of something giving way is felt, which indicates the detachment of the pterygium from the delicate cellular texture, by which it is connected with the subjacent cornea. Next, by means of a pair of scissars in the right hand, the surgeon must dissect this fold, as closely as possible, from the cornea, proceeding from the apex towards the base of the pterygium. The section being completed to where the cornea and sclerotica meet, the fold is to be again elevated still more, and, with one stroke of the scissars, the pterygium, and the relaxed portion of the conjunctiva, forming its base, are to be detached, as concentrically, and closely to the cornea, as possible. This second incision will have a semilunar shape, the horns of which ought to extend two lines beyond the relaxed part of the conjunctiva in following the curvature of the eye-ball.

When the operation is finished, the surgeon must promote the hemorrhage, by washing the part with warm water, and then cover the eye, that has been operated on, with a pledget of dry lint, or lint moistened in the aqua vegeto-mineralis, supported by a bandage, that does not make too much pressure on the part.

If no particular symptoms arise, (continues Scarpa) such as pain, tension of the eye, considerable tumefaction of the eyelids, it is sufficient to wash the eye, and inside of the eyelids, three or four times a day with a warm lotion of mallows, and carefully keep these parts from being exposed to the air, without compressing them. If the symptoms just-mentioned should afterwards occur, the antiphlogistic treatment must be adopted in its full extent, &c.

On the fifth or sixth day, at latest, after the operation, all the surface, from which the pterygium was cut, appears yellowish, and covered with a fluid, like mucus. This is a mode of suppuration (says Scarpa) peculiar to membranes in general, and particularly, to those of the eye. The edges of the wound, and the adjoining part of the conjunctiva, assume a reddish colour. Afterwards, the surface of the

wound contracts more and more daily, so that, at length, it completely closes, and the cicatrix forms.

During the whole treatment, subsequent to the operation, there is no occasion to employ any other topical applications, but the warm lotion of mallows, three or four times a day. Numerous cases have convinced Scarpa, that astringent collyria, and the boasted powders of the florentine iris, and alum, cause great irritation to the eye operated on, and give rise to tumefaction, and a fungous-like state of the conjunctiva, which are impediments to the cure. What is still more incommodious, is, that such means produce fungous excrescences on the middle of the wound itself, which only admit of being repressed and cicatrized with difficulty. Scarpa has seen all these inconveniences arise from one single unnecessary application of the argentum nitratum. On the other hand, when a mere lotion of mallows is the only remedy employed in the treatment, the cure proceeds regularly; the yellowish surface of the incision diminishes daily, and in three, or, at most, four weeks, the wound is quietly healed. The vitriolic collyrium, containing a few drops of camphorated spirit of wine, can only be prudently instilled, three or four times a day, into the eye, for the purpose of strengthening the conjunctiva and its vessels, after the wound is perfectly cicatrized.

We have already repeated Scarpa's sentiment, that the incipient pterygium, strictly speaking, is nothing more, than an opacity of the cornea, in which the venous vessels of the conjunctiva covering that part of the cornea, which is the seat of the disease, are somewhat more dilated, than in the case, to which the term, "*opacity*," is usually assigned; and, also that the density, and opacity, of the delicate layer of the conjunctiva are much more considerable, at the part affected, in the instance of pterygium, than in that of simple opacity of the cornea.

The incipient pterygium (adds this author) is not a dense, opaque membrane, but a pellicle as fine as a cobweb, interwoven in different places with varicous blood-vessels, the iris continuing tolerably visible behind it. In this early state of the pterygium, it is unnecessary to deprive the cornea of its natural covering; it is quite enough to cut off a portion of it, in order to intercept all communication between the dilated venous ramifications of the pterygium, and the varicous trunks in the white of the eye.

The recision, says Scarpa, is accomplished by cutting out, with a pair of forceps and scissars, a semilunar piece of the conjunctiva, at the point where the cornea and sclerotica conjoin, and exactly at the base of the incipient pterygium, just as is practised for opacity of the cornea. The recent pterygium is observed to disappear gradually after the operation, or to change into a slight dimness of the cornea, extending over a part of the space previously occupied by the disease. This opacity is commonly much more trivial, than what follows a cicatrix. Acrell, in his *Surgical Observations*, mentions having successfully treated an incipient pterygium in this manner. Scarpa has also tried the plan several times with success. *Scarpa sulle Malattie degli Occhi, cap.* 11.

PTO'SIS. (from πιπτω, to fall down.) An inability of raising the upper eyelid. The affection may be owing to several causes, the chief of which are a redundance of skin on the eyelid; a paralytic state of the levator muscle, a spasm of the orbicularis. Ptosis from the first cause may be cured by cutting away the superfluous quantity of skin. When the case depends on paralysis, the surgeon may try bathing the eye and surrounding parts with cold spring water, and rubbing the eyelid and eyebrow with any liniment containing a little of the tincture of cantharides. The linimentum camphoræ; the shower bath; and bark; may also be occasionally tried. The spasmodic ptosis requires antispasmodic medicines; the application of a blister to the temple; and fomenting and bathing the eye and eyelids with a decoction of cicuta, or poppy-heads.

PTYALISMUS. (from πτυαλιζω, to spit.) A copious discharge of saliva.

PUNCTURED WOUNDS. See *Wounds*.

PUPIL, CLOSURE OF. An inconvenience, not frequent indeed, but which however sometimes follows the operations of depression, and extraction, is a closure of the pupil in such a degree, that it becomes almost, or quite shut, attended at first with a diminution, and afterwards with an entire loss, of sight.

This unpleasant occurrence, says Scarpa, is most frequently the consequence of a vehement inflammation of the internal membranes of the eye, especially, the iris, occasioned by the extraction, or depression, of the cataract. In some particular instances, this inconvenience follows one of these operations, but without the inflammation of the internal parts of the eye, and especially of the iris having any share in its origin, at least, as far as we can judge from appearances. In such circumstances, after an indeterminate time from the operation of depression, or extraction, the pupil is perceived to diminish in diameter daily, without any evident cause, so that at last it becomes, as it were, entirely obliterated, and that without the patient complaining of any

uneasiness in the eye, if we except, in a few individuals, a greater sensibility, than is natural, in the immediate organ of vision, even to a very moderate degree of light. In both cases, the pupil ordinarily closes so much, that it can hardly admit a small pin's head, and continues motionless; while within the situation of the pupil itself, the iris assumes a stellate, rugose appearance, with a little irregular aperture in the centre, behind which, when the cataract has been extracted, or depressed, the deeper part of the eye seems black; or, if a portion of the anteriour convexity of the opaque crystalline capsule, should chance to remain behind after one of these operations, and has subsequently come into contact with, and adhered to, the posteriour surface of the iris, a small whitish speck, or veil, may be seen there.

Theory has induced some to suppose, that, when this morbid closure of the pupil originates from an excessive distention of the vessels of the iris, in consequence of severe inflammation affecting that membrane, it may be cured by means of local and general bleeding, purgatives, blisters, and a seton in the nape of the neck. On the other hand, they have deemed emollients, and internal and external antispasmodics, serviceable, in the instance of constriction of the pupil arising from spasm of the iris, and increased morbid sensibility of the immediate organ of sight, in consequence of the sympathy of the latter with the iris. But, how plausible soever these curative indications may seem to be for the closure of the pupil, practice has not admitted their efficacy. On the contrary, says Scarpa, it has clearly evinced, that this disease cannot be remedied, except by making an artificial opening in the iris, as a substitute for the natural pupil, now wholly, or partly obliterated, and as an aperture, which is to do the functions of the original one.

To the best of Scarpa's knowledge, Cheselden was the first, who ventured to devise, and execute, a section of the iris, for the purpose of forming an artificial pupil. He introduced a couching needle, having a sharp edge only on one side, through the sclerotica, at the distance of a line and a half from the cornea, into the interior of the eye. After perforating the iris towards the external angle, and then pushing the point of the needle through the anteriour chamber of the aqueous humour, as far as that side of the iris, which is nearest the nose, he turned the edge of the instrument backward, and withdrew it, so as to make a transverse division of the iris.

It is related, that this operation was attended with the greatest success. However, Janin (*Mem. sur l'Œil*) assures us, that, having performed it on two subjects with the utmost care possible, he did not find the smallest benefit follow it; for, in these two patients, as soon as the symptoms, produced by the operation, subsided, he found the transverse section, made in the iris by the edge of the needle, re-united, and consolidated. Sharp had experienced the same thing, before Janin. (*On Operations, chap.* 29.)

An accident occurred to Janin, in the act of extracting a cataract; viz. he included the iris together with the cornea, in Daviel's scissars, and cut it perpendicularly. This circumstance taught him, as he expresses himself, that a perpendicular section, made in this membrane, on one side of the pupil, was the only truly efficacious method of preventing the edges of the wound of the iris from growing together again, so as to form a durable artificial pupil. This is exactly what led this oculist to make it an operative method, and to propose it, as the best expedient for making an artificial pupil. His plan consisted in opening the cornea, as is practised for the extraction of the cataract, and in dividing the iris perpendicularly with scissars, near that part of the pupil, which is next to the nose, and he affirms, that he has seen strabismus result from making the section towards the external side, on account of the too great divarication of the optical axes.

In the small number of cases of closure of the pupil, which Scarpa has seen and treated, as consequences of the operation of the cataract by extraction, or depression, he has never been able to make up his mind to open the cornea, in order to accomplish with scissars the perpendicular section of the iris, as proposed by Janin, or with the knife, as recommended by any other person. He has felt conscious of the frequent severe symptoms, which arise from making an opening into the cornea, when the eyes have already been affected, after the first operation, with violent internal ophthalmy, spasm, and morbid increase of sensibility in the immediate organ of sight. He says, he will never cut the cornea again after the extraction of the cataract, lest an irregular cicatrix should be the consequence. He is the less inclined to do so, as he is convinced, that it is not so easy, as some may conceive, to divide the iris, with scissars, when it has become flaccid in consequence of the escape of the aqueous humour. Scarpa had had occasion to see more frequently, than once, the edge of the iris detached, by blows on the eye-ball, from the ciliary ligament, to the extent of two lines, and without any laceration of the body of this membrane. At the place where the iris had

been separated from the ciliary ligament, he says, he had seen an oval fissure remain during the rest of the patient's life, and it might have answered every purpose of an artificial pupil, had not the immediate organ of vision, and the crystalline, in the instances alluded to, suffered too severely from the violence of the blow. In a case of prolapsus of the iris, through a small ulcer of the cornea, where the former part was very much dragged, in consequence of the large portion of it protruded, and the adhesion, which it had contracted with the edges of the ulcer of the cornea, Scarpa had remembered, that this same part, the iris, instead of being lacerated at its middle, had rather been detached, for a certain extent of its circumference, from the ciliary ligament, so as to produce there an artificial pupil, which was very serviceable to the patient after the cure of the prolapsus of the iris. Scarpa likewise called to mind, that in depressing a cataract, he had seen a similar separation of the margin of the iris from the ciliary ligament take place, in consequence of having merely pushed the opaque crystalline inadvertently against the internal edge of this membrane, at the moment, when the lens continually rolled round the spear of the straight needle, without his being able to seize it, so as to immerse and depress it deeply in the vitreous humour. Besides these circumstances, it had often occurred to him to observe in frequent dissections of the eye, that on taking hold of the iris with forceps, and pulling it, not only at a little distance from its greatest disk, but also at the very edge of the pupil, this delicate membrane more readily became detached from its junction with the ciliary ligament, than lacerated at its middle, although it is certainly of a very soft nature. Lastly, it cannot be doubted, that the iris is a membrane perfectly distinct from the choroides, and has a proper, though feeble, connexion with the ciliary ligament, independently of the union of the choroides with the same ligament.

All these considerations taken together, especially that of the feeble union of the iris with the ciliary ligament, and, consequently, of the greater facility of detaching the edge of the iris from the ligament, with which it is connected, than of lacerating the body of this membrane, have induced Scarpa to try a new method of forming an artificial pupil, when the natural one has become too much contracted, or quite obliterated, after the extraction, or depression of the cataract. This method of operating, consists in detaching, by means of a couching needle, a certain extent of the circumference of the iris from the ciliary ligament, without ever preceding this operation by a section of the cornea. The attempt met with success.

The patient being seated, and supported, as if he were about to have the operation for the cataract performed, a straight couching needle, not so large as that which most surgeons use, but slender, like that which Scarpa prefers, (see *Cataract*,) is then to be introduced through the sclerotica, at the external angle of the eye, about two lines from the union of this membrane with the cornea; and its point is to be pushed as far as the upper and inner edge of the iris; in other words, as far as that side of the iris which is nearest the nose. The needle advances nearly to the ciliary ligament, and the surgeon perforates the internal edge of the iris, at its upper part, so that the point of the instrument scarcely appears in the anteriour chamber of the aqueous humour, because, that part of the anteriour chamber being very narrow, the point of the instrument, how little soever it might advance beyond the iris, would enter the substance of the cornea. The moment the needle appears in the anteriour chamber, the instrument must be pressed on the iris from above downward, and from the internal towards the external angle, so as to bring it in a parallel line to the anteriour surface of the iris, for the purpose of detaching a portion of the edge of this membrane from the ciliary ligament. This separation being effected, the operator (continues Scarpa) must depress the point of the needle, in order to apply it to the inferiour angle of the slit, that he has begun to make. Then the aperture may be enlarged at pleasure, by pushing the iris towards the temple, and withdrawing the needle from before backward, parallel to the anteriour surface of the iris, and the greatest axis of the eye. If, when this detachment has been accomplished, no opaque body should appear at the bottom of the eye, the needle is to be withdrawn altogether. If any portion of opaque capsule, left behind after the depression or extraction of the cataract, should afterwards advance, and present itself in the vicinity of the new pupil, the little opaque membrane must be reduced to fragments, and pushed through the artificial opening into the anteriour chamber, where, as we have shewn in the article *Cataract*, such membranous portions, or flakes of the capsule, are, in time, dissolved and absorbed with the aqueous humour, which is continually undergoing a renovation.

This separation of the iris from the ciliary ligament, invariably occasions an extravasation of blood, which always renders the aqueous humour more or less turbid; but the turbidness is afterwards

absorbed, and the eye recovers its original transparency.

The patient, says Scarpa, complains, during the operation, of a vast deal more suffering, than at the time when he undergoes the extraction or depression of a cataract. It cannot be otherwise; for, in detaching a part of the edge of the iris from the ciliary ligament, some filaments of the ciliary nerves, which proceed to be distributed in the iris, must at least be dragged, or lacerated. However, on the whole, the symptoms consequent to this operation, have neither been obstinate nor fatal in the two cases which Scarpa has seen. From some experiments made on the dead subject, Scarpa thinks the curved needle, which he uses for the depression of the cataract, would also be better than the straight one for making an artificial pupil; a thing which he intends to ascertain the first favourable opportunity. (*Scarpa sulle Malattie degli Occhi, Capo* 16.) *Consult also Gibson on the Artificial Pupil. Richter Vonder Verschlossnen Pupille, in Anfangsgr. der Wundarzn. Band* 3, *Kap.* 9, *Gottingen*, 1795.

PUS. (from πυον, matter.) The fluid formed by the process of suppuration. See *Suppuration*.

R

RACHITIS. (from ραχις, the spine of the back, because the disease was once supposed to depend on disease of the spinal marrow.) The rickets. See this word.

RANULA. (dim. of *rana*, a frog.) A whimsical name applied to a tumour under the tongue, arising from an accumulation of the saliva in the ducts of the sublingual gland. The term has either been derived from an imaginary resemblance of the swelling to a frog, or from the disease making the patient, as it were, croak when he attempts to articulate. The writers, who have treated of this disease, before it was known, that the parts affected by it were destined for the secretion of the saliva, have had no accurate notions of its true nature. Celsus has been supposed to have alluded to the ranula, in the fifth section of his seventh book, where, after treating of the diseases of the tongue, he continues with the following passage: *sub linguâ quoque interdum aliquid abcedit, quod fere consistit in tunicâ, doloresque magnos movet.* The latter circumstance, however, renders it probable, that some other affection was alluded to, as a ranula is rather attended with a sense of restraint, than of pain. Various erroneous sentiments were entertained, concerning ranula, by authors, who treated of it subsequently to Celsus. Paré thought it proceeded from an accumulation of a pituitary, cold, viscid matter, which descended from the brain beneath the tongue. Fabricius ab Aquapendente considers the ranula as an encysted tumour of the meliceris kind. Dionis is of a similar opinion. Munick, better acquainted with the modern discoveries of anatomy, does not mistake the nature of the present disease; and he expressly says, that the affection originates from a thick, acrid saliva, which, not being able to pass out of the salivary ducts, accumulates under the tongue, so as to cause a swelling in that situation. Far from adopting the opinion of Munick, Heister fell back to that of Fabricius, and borrows every thing from this author.—Lastly, De la Faye, in his notes on Dionis, has taken up Munick's sentiments; he says, that, "there are two sorts of ranulæ; some, which are round, and situated beneath the tongue, seem only to be produced by a dilatation of the excretory duct of the sublingual gland; the others are longer, than they are round; are situated at the side of the tongue, and are formed by a dilatation of the excretory duct of the inferior maxillary gland. The fluid, which fills such tumours, is the saliva which lodges and gradually accumulates in them, in consequence of its viscidity and atony of the duct.

The ranula is said to be frequently met with in persons who move their tongue a great deal, and in those who sing. The fluid in the tumour is precisely like white-of-egg; but, it is thicker after having remained a long while in the swelling; it is occasionally of a calcareous, and even stony nature. Modern surgeons are of opinion, that the ranula does not proceed from an inspissation of the saliva, but from an obliteration of the duct, or orifice, of this tube. The collection of saliva often produces a tumour of very large size; but, it generally bursts when it has attained the dimensions of a walnut, and then leaves an ulcer, which cannot be healed while the real cause of the disorder remains unknown.

Mr. B. Bell mentions his having seen

an ulcer of this kind treated with the utmost care for several months; various detergent and corrosive applications had been employed; and even a mercurial course was resorted to; but all in vain. At length, the true cause of the disease having been ascertained, a cure was accomplished in a few days, by removing a piece of calcareous matter, which by obstructing the ducts, had first caused a swelling, and then the ulceration which ensued.

The edges of the opening very often close again, especially when it has been made with a lancet, and not of sufficient size. In this case, the swelling makes its appearance again, some time afterwards. M. Louis observes, that the ancients have made the same remark; and hence, Paré preferred the actual cautery to the lancet. Dionis also mentions his having seen ranulæ, which recurred in consequence of a mere opening having been made with a lancet; and he recommends, for the prevention of this, applying a mixture of honey of roses and vitriolic acid to the inside of the cyst, so as to destroy it. M. Louis remarks, that all authors seem to regret, that the situation of the tumour should prevent the sac from being totally dissected out. The success, which Fabricius ab Aquapendente experienced, when he merely opened the tumour its whole length, did not free him from this prejudice; and Heister says, he should prefer extirpation, if the nature of the adjacent parts, which would be wounded, were not a formidable objection. But, if this pretended cyst, this pouch, is nothing else than the gland itself, or its duct, dilated by the retention of the saliva, its inside should not be irritated. Whenever a sufficient opening is made, no relapse takes place. Munick particularly advises such an incision, and Rossius mentions the smallness of the opening, among the defects in the treatment, and its being a cause of the disease returning. However, he does also recommend destroying the sac; but, specifies for the purpose, only astringent drying applications, which did not act in so powerful a manner.

In a ranula, there is nothing like a cyst which ought to be extirpated. It is enough to lay the cavity open, and occasionally to cut off the edges of the incision, when they will not otherwise unite. M. Louis always observed, that the radical cure depended on a fistulous aperture, through which the saliva continued to flow; and that, when this opening was situated behind the lower incisor teeth, a very annoying ejaculation of the saliva took place, in certain motions of the tongue. This inconvenience must be obviated, to render the cure complete. For this purpose, such an opening for the saliva must be made, as will not close. The perforation of the tumour with the actual cautery, was Paré's method; and thus a durable opening might certainly be obtained, for the excretion of the saliva, in a part of the mouth more backwards, so that patients would be freed from the disagreeableness of continually slobbering, or having their spittle ejected from their mouths in talking.

The ranula, when of long standing, is sometimes so large as absolutely to hinder a person from articulating. M. Le Clerc has recorded a case, in which the root of the swelling extended under the tongue; the tumour filled the whole mouth; the prominence it formed outwardly, was as large as a duck's egg; and the disease, in its progress, had made the teeth of both jaws project outward. At some parts of its surface, a fluctuation was perceptible; other places were exceedingly hard. The patient, who could hardly breathe, demanded assistance: and a puncture was made in the softest part of the outside of the swelling. A thick yellowish fluid issued out of the cannula. The opening was enlarged with a knife; and about a pint of gritty, inodorous matter was extracted. There was no hemorrhage from the cut; and, no sooner had the contents of the swelling been taken out, than the patient began to articulate, which he had not been able to do for a long while. The sides of the tumour having been so prodigiously distended, M. Le Clerc thought it proper to destroy the inside of the cavity with a tent, dipped in a mercurial solution. The cure was completed in a month, and the tongue gradually regained its original size, a part of which it had lost.

But, as M. Louis observes, fortunate as the termination of this case was, it must not be indiscriminately set down, that destroying the cyst, or even opening the tumour, is always requisite. A more simple method will sometimes succeed. In a particular case, which this gentleman has related, a sinuosity, which divided the swelling into a right and left portion, made him suspect that it consisted of two sacs, in contact with each other. On each side, in front, and in the same line, there was a point, which was the orifice of the salivary duct, somewhat dilated, and blocked up with a viscid matter. Having very easily passed a small probe into the orifices, a matter, similar to white of egg, made its escape. A small leaden probe was passed into each opening, and, two days afterwards, the sacs were emptied again, and two pieces of lead, somewhat larger, introduced. The man was advised to take out

the pieces of lead every morning, empty the swelling, and then replace them. In a fortnight, the openings, having been kept continually dilated, had no tendency to close; the saliva had not accumulated since, and the ranulæ had not appeared again.

In certain cases, the above means are quite inadequate, and the tumour must be totally extirpated. M. Boinet has related, to the French Academy, a case in which the swelling not only filled the whole mouth, but one half of the tumour projected out, and a cure could only be accomplished in the latter manner. The two upper incisor teeth, on the left side, were lodged in a depression observable there; and the canine tooth, of the same side, forced outward by the mass of disease, had pierced the lip near its commissure. A fluid, resembling mucus, flowed from a narrow aperture, at the lower part of the swelling. The tongue could not be seen, so much was it pushed backward; and, for some time, the patient had only subsisted on liquid food, which he was first necessitated to convey to the back of the throat, with some mechanical contrivance. The four incisor teeth, two canine, and first grinders of the lower jaw, had been pushed out of their sockets, by the pressure of the swelling. The patient's aspect was alarming, and he was threatened with suffocation. Extirpation was deemed necessary, and it was performed, with all the caution, which the situation of the tumour demanded. The large cavity thus occasioned, was filled with lint. The lower jaw being found diseased, M. Boinet scraped some of its surface off, and covered the places with lint, either dry, or dipped in spirit of wine. Some exfoliations followed, and the fungous granulations which grew, were repressed with proper applications. In three months, the parts were healed in so regular a manner, that the motion of the tongue was not in the least obstructed, and no change continued, except the alteration of the voice, occasioned by the loss of teeth. This case is very interesting, and shews how much may be hoped for in difficult cases, from prudent and judicious measures. (*Encyclopédie Méthodique*; *Art. Grenouillette. Mem. de l'Acad. de Chirurgie, tom.* 3.)

RASPATORIUM. (from *rado*, to scrape.) A kind of rasp formerly employed by surgeons.

RECTUM. The last large intestine, terminating in the anus, is so named, from an erroneous opinion that it was straight, while, in fact, it is semilunar, being adapted to the concavity of the sacrum.

Piles, which are a disease of the veins of this bowel, are treated of under the term *Hemorrhoides*.

The rectum is also subject to have tumours formed in it. Mr. Hey mentions a young man, who had had, for two years, a swelling in this bowel. The tumour protruded from the anus, whenever the patient went to stool, and generally bled on the same occasion. The disease had been, from the first, attended with pain in the loins. On examination, Mr. Hey found the swelling to be of the size of a nutmeg, adhering to the intestine by a narrow basis. It was firmer in its texture than piles usually are, except when inflamed. The apprehension of a troublesome hemorrhage, led Mr. Hey to prefer tying the base of the swelling to cutting it away, and thus he successfully extirpated the disease. (*Practical Observations in Surgery, p.* 443.)

The *scirrho-contracted* rectum is what we have chiefly to consider in the present article. Scirrhus of the rectum is not uncommon at an advanced period of life. Sometimes it extends over a considerable length of the gut, but generally it is more circumscribed. The coats of the bowel become much thicker and harder than in the natural state. The muscular is subdivided by membranous septa, and the internal coat is sometimes formed into hard, irregular folds. The surface of the inner membrane is occasionally ulcerated, so as to form a cancerous disease. Every vestige of the natural structure is sometimes lost, and the gut is changed into a gristly substance. The cavity of the bowel is always rendered narrow at the scirrhous part, and is, sometimes, almost obliterated. When the passage through the gut is very much obstructed, the bowel is always a good deal enlarged just above the stoppage, or stricture, from the accumulation of the feces there. As the disease advances, adhesions form between the rectum and adjacent parts, and ulcerations produce communications between them.

The disease is usually not much noticed till somewhat advanced, not being at first very painful. The patient only thinks, that he is costive, and that he voids his stools with a little difficulty. In time, a good deal of pain is felt in the part affected, especially at stool, after which, some relief is experienced. Pus and blood may sometimes be noticed with the excrement, particularly when the disease has advanced to the ulcerated state. The patient at length becomes sallow, the constitution suffers, and dissolution follows. Severe tenesmus attends the whole course of the disease.

Desault has often seen the disease form a communication between the rectum and

vagina, and the feces have passed through the latter part. In the latter stage of the affliction, the rectum, bladder, vagina, uterus, and adjacent parts, are all involved in one common ulceration.

When the disease has attained the ulcerated state, it is probably always incurable. Palliatives can now only be resorted to, such as anodyne and emollient glysters, the warm-bath, &c. with the exhibition of medicines like opium, cicuta, uva ursi, &c. Claudius applied his remedies to the inside of the bowel, by means of tents, and did not employ the latter as a mode of curing the disease, when less advanced. Valsalva used to introduce a cannula, pierced with numerous holes, when his patient got into the bath, so as to let the fluid enter the intestine. Numerous practitioners, among them Morgagni, made mercurials the base of their treatment, from a supposition that the complaint was of venereal origin.

When the disease is not attended with ulceration, the contraction and thickening of the gut may be diminished, by introducing bougies, keeping them for a certain time, every day, so introduced, and increasing their size gradually. The pressure of these instruments seems to lessen the disease, and stop its progress; a proof that its nature differs from that of what is usually understood by scirrhus. Desault used to employ long tents, made of lint, smeared with cerate, and passed into the bowel by means of a probe, with a forked end. This surgeon gradually increased the size of the tents, so as to continue the compression, to which he conceived all the good was owing. Their length was also augmented, by degrees. Fresh ones were, at first, introduced twice every day. When any hardnesses were situated on the outside of the anus, Desault cured them on the same principle, viz. by making pressure on them, with compresses and a bandage. This eminent surgeon effected a cure of a scirrho-contracted rectum by this method. The woman was taught to pass occasionally the tents herself, so as to prevent a relapse. The disease is said to afflict women more frequently than men: from a comparative table kept at the Hôtel-Dieu, this has been the case there in the proportion of ten to one.

See *Baillie's Morbid Anatomy*. *Œuvres Chirurgicales de Desault par Bichat, Tom. 2. p. 422.*

REFRIGERANTS. (from *refrigero*, to cool.) A term often applied by surgeons to such remedies and applications as cool the whole body, or any part of it.

REGIMEN. (from *rego*, to govern.) The regulation of the diet.

REPELLENTS. (from *repello*, to drive back.) Applications are sometimes so named which make diseases recede, as it were, from the surface of the body.

RESOLVENTS. (from *resolvo*, to loosen.) Medicines which disperse swellings, inflammations, &c. The term originated from the idea that the tenacious humours were loosened.

RESOLUTION. (from *resolvo*.) The subsidence of inflammation, without any abscess, ulceration, mortification, &c. being occasioned, is so named. The dispersion of swellings, indurations, &c.

RETENTION OF URINE. See *Urine, Retention of.*

RETROVERSIO UTERI. A turning backward of the womb. See *Uterus, Retroversion of.*

REVULSION. (from *revello*, to draw away.) An old term, used by the humoral pathologists, signifying the drawing of humours a contrary way.

RHACOSIS. (from ῥάκος, a rag.) A ragged excoriation of the scrotum.

RICKETS. (*Rachitis.*) Is mostly met with in young children; seldom in adults. Morand, however, (*Acad. des Sciences*, 1753,) mentions an instance in which an adult became affected. Pinel has given a description of the skeleton of a ricketty fœtus. (*Fourcroy's Journal.*) The disease seems to consist of a want of due firmness in the bones, in consequence of a deficiency of the phosphate of lime in their structure. The causes of the affection are involved in great obscurity, and authors have referred them to scrophula, scurvy, lues venerea, difficult dentition, &c.; mere conjectures, which it is not worth while to enquire into. Ricketty subjects are often at the same time scrophulous; but, this is, probably, the only reason for scrophula being accounted a cause of the other affection. The particular appearances of ricketty children, we need not detail, as every one is familiarly acquainted with them: such children are usually of a bad, weak constitution, and their limbs and bones become bent in such directions as the actions of the muscles, the weight and pressure, &c. which they sustain, determine. When the affection is very general, the spine becomes shorter, and is curved in various directions; the breast becomes deformed, not only in consequence of the curvature of the spine, but by the depression of the ribs, and projection of the sternum. The bones of the pelvis fall inwards, and the os pubis generally approaches the sacrum. The latter circumstance is one of the causes of difficult parturition. The clavicles become more bent and prominent forward; the os humeri is distorted outward; the lower ends of the radius and ulna are twisted in the same direction; the thighs are curved forwards, or out-

wards; the knees fall inwards; the spine and front surface of the tibia become convex; and the feet are thrown outwards.

When the thoracic viscera are considerably oppressed by the alteration in the figure of the chest, produced by the rickets, the disease may bring on fatal consequences.

Many infants, which are very ricketty and deformed, improve as they grow up, and their constitutions acquire strength. The deformity of the bones of their limbs spontaneously diminishes, and these parts gain a due degree of firmness, resulting from a proper deposition of the phosphate of lime in their texture.

The restoration of the proper figure of the bones may sometimes be promoted by the constant pressure of bandages and mechanical contrivances, sold in the shops. (See *Distortion.*) Some authors, however, contend, that in very young children machines are useless, as the confinement and inactivity of the muscles, necessarily occasioned by such contrivances, must increase the general debility, and consequently the disease. But, all writers allow, that, after a certain age, and when the strength is not too much exhausted, mechanical aid is proper. Were I to offer my own sentiments on this subject, they would be in favour of the employment of proper machines and bandages, at an early age.

No medicine is known, which possesses any direct efficacy in cases of rickets.—Tonics are indicated, and should be employed. More good, however, may be effected by keeping children in healthy situations, and in a salubrious air, than by any medicines, whatever. Light, wholesome, nutritious, easily digestible food; cold bathing; the use of the flesh-brush, &c. are also highly serviceable. The constitutional treatment of rickets belongs more properly to the physician than the surgeon; and it is not necessary to introduce more of the subject in a Dictionary expressly allotted to surgery. The reader may consult *Boyer's Lectures on the Bones, Vol. 2, Chap. 2,* if he wishes to see the various absurd notions which many have entertained concerning rickets.

RIGOR. (from *rigeo,* to be cold.) A cold chill. A shivering.

RUBEFACIENTS. (from *rubefacio,* to make red.) Applications which make the skin red.

RUBINUS. (from *ruber,* red.) A carbuncle, named from its colour.

RUPTURE. A protrusion of some of the abdominal viscera. A hernia. See *Hernia.*

S

SABINA. (said to be named from the Sabines, whose priests used it in their religious ceremonies.) Savine. The use of the leaves of this plant, in forming the active ingredient in the ointment commonly preferred for keeping open blisters, we have explained in the article *Blisters.* The other chief surgical use of savine, is as a stimulating application for destroying warts, and other excrescences. For the latter purpose, it is generally powdered, and mixed with an equal proportion of ærugo æris. The same powder is also sometimes employed by surgeons for maintaining the hollows in which peas are inserted in issues. The best plan is, first to wet the peas, then roll them in the powder, and put them, in this state, on the issue. But, when the whole surface of the issue has risen high, above the level of the skin, the powder must be sprinkled all over the sore, so as to produce an absorption of the high granulations.—Indeed, even in this manner, a good cavity often cannot be obtained; and, it becomes necessary to destroy the surface of the issue, by rubbing it with the kali purum, or kali purum cum calce vivâ.

SACCHARUM SATURNI. Sugar of Lead. Cerussa Acetata. Acetite of Lead. This is very extensively used in surgery, chiefly as a local application to inflamed parts, and in the form of a lotion. See *Inflammation, Collyrium, Lotio, Gonorrhœa, Ophthalmy,* and numerous other articles of this Dictionary, for an explanation of the uses of acetite of lead.

SAL-AMMONIAC. *Ammonia Muriata. Muriate of Ammonia.* Employed a good deal by surgeons, as an ingredient in discutient lotions. See *Lotio Ammon. Mur.*

SALIVARY FISTULÆ. See *Parotid Duct.*

SALIVATION. An increased secretion of the saliva, excited by mercury.

SA'NIES. (*Latin.*) A thin, serous matter, discharged from fistulæ, un-

healthy sores, &c. It is sometimes tinged with blood.

SAPO TEREBINTHINÆ. (*Starkey's Soap.*) ℞. Kali præpar. calidi ℥j. Olei Terebinth. ℥iij.—The hot kali præparatum is to have the oil of turpentine gradually blended with it, in a heated mortar. Indolent swellings were formerly rubbed with this application, and, perhaps, some chronic affections of the joints might still be benefited by it.

SARCOCE'LE. (from σάρξ, flesh; and κήλη, a tumour.) A fleshy enlargement of the testicle. (See *Testicle, Diseases of.*)

SARCO'MA, *Sarcósis*, (from σάρξ, flesh.) A fleshy tumour on any part of the body. (See *Tumours, Sarcomatous.*)

SARCO'TICS, (from σαρκόω, to incarnate.) *Sarcotica.* Medicines which promote the formation of granulations in wounds and sores.

SARSAPARI'LLA. The root of sarsaparilla was brought into Europe about 1530. It was at first reputed to possess singular efficacy in venereal cases; but, afterwards lost all its fame. Sarsaparilla was again brought into notice by Dr. W. Hunter, who advised Dr. Chapman to make trial of it in a bad case of phagedenic bubo; and the benefit, obtained in this instance, led Dr. Hunter to extend the recommendation of the medicine. Sir W. Fordyce stated, that sarsaparilla would quickly relieve venereal head-achs, and nocturnal pains, and if persisted in, cure them; that in emaciated, or consumptive habits, from a venereal cause, it was the greatest restorer of appetite, flesh, colour, and strength, which he knew of; that when mercurial frictions had been previously employed, it would generally complete the cure of the disease of the throat, nose, palate, or spongy bones; and that it would promote the cure of blotches and ulcers, sometimes accomplish it, *even without mercury*; though, in this circumstance, there was danger of a relapse. Sir W. Fordyce said, sarsaparilla was of little use in chancres; but, when these or buboes, would not heal, after the employment of mercury, it would, often cure, and always do good. He allows, however, that, in all venereal cases, *sarsaparilla is not to be trusted to, unless preceded by, or combined with, the use of mercury*; and he thought sarsaparilla would, probably, always cure what resisted mercury. (*Medical Obs. and Inq. Vol.* 1.)

The celebrated Cullen considered sarsaparilla as possessing no virtues of any kind; for, (says he,) "tried in every shape, I have never found it an effectual medicine in syphilis, or any other disease." (*Mat. Med. Vol.* 2.)

Mr. Bromfield declares, that he never saw a single instance in which sarsaparilla cured the venereal disease, without the aid of mercury, either given before, or in conjunction with it. (*Pract. Obs. on the Use of Corrosive Sublimate, &c. p.* 78.) Mr. Pearson also contends, that sarsaparilla *has not the power of curing any one form of the lues venerea*; but, he allows that it may suspend, for a time, the ravages of that contagion, the disease returning, if no mercury should have been used. This gentleman admits, also, that sarsaparilla will alleviate symptoms derived from the venereal virus. He maintains, that the exhibition of sarsaparilla does not diminish the necessity for giving less mercury. Nocturnal pains in the limbs, painful enlargements of the elbow and knee, membranous nodes, cutaneous ulcerations, and certain other symptoms, resembling venereal ones, are often experienced after a full course of mercury. Such complaints, Mr. Pearson allows, are greatly benefited by sarsaparilla, and exasperated by mercury; and, he observes, that it is from these complaints having been mistaken for venereal ones, that the idea has arisen, that sarsaparilla has cured syphilis, when mercury had failed. Mercury, and the venereal poison, may jointly produce, in certain constitutions, symptoms which are not strictly venereal, and are sometimes more dreadful, than the simple effects of syphilis. Some of the worst of these appearances are capable of being cured by sarsaparilla, while the venereal virus still remains in the system. When this latter disease has been eradicated by mercury, sarsaparilla will also cure the sequelæ of a course of the other medicine. (*Pearson on the Effects of various Articles in the cure of Lues Venerea*; 1807.)

SCA'BIES. (from *scaber*, rough.) The itch.

SCA'LPEL. (from *scalpo*, to scrape.) *Scalpéllum. Scálprum.* Originally a raspatory, or instrument for scraping diseased bones, &c. The term now generally signifies, a common, straight, surgical knife.

SCA'RIFICATION. (from *scarifico*, to scarify.) *Scarificatio.* The operation of making little cuts, or punctures, in a part, for the purpose of taking away blood, letting out fluid in anasarcous cases, or air, in instances of emphysema.

SCIRRHUS, SCIRRHO'MA, SCIRRHOSIS. (from σκίρρος, to harden.) The etymological import of these terms seems merely to be any induration. The first is now generally restricted to the induration, which precedes cancer, in the ulcerated state.

SCLERIASIS, SCLEROSIS. (from σκληρόω, to harden.) A hard tumour, or induration.

SCLOBETOPLA'GA. (from *sclopetum*, a gun; and *plaga*, a wound.) A gun-shot wound.

SCOLI'ASIS. (from *σκολιαω*, to twist.) A distortion of the spine.

SCORBU'TUS. (from *schorboet*, Germ.) The scurvy.

SCRO'PHULA, OR SCROFULA. (from *scrofa*, a sow.) The king's evil, so named, because swine are said to be subject to it, called also, *struma*. A disease, the chief, or at least, the most palpable symptom of which is a swelling of the absorbent glands, in various parts of the body, which glands tend very slowly to a state of suppuration, that is almost always imperfect. Scrophula generally shews itself during infancy, between the age of three and seven; sometimes rather sooner; but, frequently, as late as puberty, and, in some instances, though a very few, not till a much more advanced period of life. In the latter cases, the disease is said to be rarely so complete, or well marked, as it is in young subjects. Scrophula is also as hereditary as any disease can be; that is to say, it is so as far as any particular kind of temperament, or constitution, can descend, more or less completely, from parents to children. Mr. White, in his treatise on struma, has strongly censured calling the disease hereditary; but, his observations only lead to these conclusions, that children, born of scrophulous parents, are not invariably affected with scrophulous diseases; and that, sometimes, one child has some strumous affection, while the parents, and all the rest of the family, have no appearance of scrophulous habits. However, I should conceive, that neither Mr. White, nor any other writer will maintain the opinion, that scrophula does not much more frequently afflict the children of scrophulous parents, than the offspring of persons, who have always been perfectly free from every tendency to any form of this affliction. Too numerous are the facts, which occur to my own mind, to allow me to entertain the smallest doubt, that scrophula runs very much in certain families. In this sense, I think the term *hereditary* perfectly accurate and allowable. But, at the same time, I beg the reader to understand, that I have no intention of questioning what seem to be irrefragable truths, viz. that the children of scrophulous parents often continue, as long as they live, entirely free from the disease; and that one child is sometimes afflicted, while its father, mother, brothers, sisters, and all the rest of its relations, have never had any tendency to strumous disorders.

When scrophula does not actually take place at a very early period of life, it is generally stated by writers on the subject, that the particular constitutions, in which there is a disposition to the disease, are, in a certain degree, distinguishable. In the individuals, possessing the disposition in question, a peculiar softness and flaccidity of fibre are remarkable; their hair is more frequently light coloured than dark; and their eyes are said to be more often of a blue, than any other colour. Their skin is generally very fine, and even handsome, both in regard to its outward texture, and complexion. Subjects with scrophulous constitutions, frequently have a kind of thickening of the upper lip; this swelling is sometimes very considerable, and occasionally extends as far as within the nostrils. Scrophula is also very often complicated with rachitis, or follows the latter affection; but, there is as little reason for supposing rickets to arise from scrophula, as this latter from rickets. In some instances, however, the complexion is dark, and the skin coarse; but, in these subjects, at least when young, the face is generally tumid, and the look unhealthy. (*Burns on Inflammation, Vol. 2, p. 232.*)

Mr. White seems, as I think, with some appearance of truth, to deny that grey, or blue eyes, light hair, and a fair complexion, ought to be considered as marks of a scrophulous predisposition; for, the majority of children in this country have light hair, and eyes, while young, which become darker as they advance in life. Now, as the majority of scrophulous patients are children, and young subjects, and as most children in this country have naturally the kind of hair and eyes above described, it seems inaccurate to lay any stress on persons affected with struma, or predisposed to this disease, having such appearances. (See *White on the Struma or Scrofula, p. 38. Edit. 3.*)

I believe the fact is now almost generally admitted, that females are rather more subject, than males, to scrophulous disease.

Struma, according to Mr. White, is as universal a complaint as it is ancient; but it prevails more extensively in temperate latitudes, than in very hot or very cold climates. It is also more frequent in some parts of Europe than others; and, in this country, it has been found to be most general in the counties of Suffolk, and Lancashire. At all periods, it seems to have been a very common complaint in this island. From history, we learn, that it was denominated the king's evil in the time of Edward the Confessor, who is supposed to have been the first that attempted to cure it by the royal touch. From a register kept in the royal chapel, we find that Charles the Second touched 92,107 persons, in a certain number of years; and this equally bigotted and useless practice was not discontinued till a recent period, when kings were found to be, as well as their poorest subjects, totally destitute of all supernatural power.

Scrophula is not communicable from one person to another; neither can it be conveyed into the system by inoculation. The opinion also, that scrophulous nurses may infect children, seems also to rest on little foundation. (See *White*, *p.* 56, 57.)

The parts, which are most frequently affected by scrophula, next to the lymphatic glands, are the spongy heads of the bones, and the joints. The form, which the disease assumes in the latter situations, is particularly described in the article *Joints*. The disorder of the spine, attended with a paralytic affection of the lower extremities, is, no doubt, very frequently of scrophulous origin. (See *Vertebræ*.) The abscess, which forms in the cellular substance, between the peritoneum and psoas muscle, is often regarded as a strumous disease; and when the contents of the abscess are found to contain flakes of a curdy matter, somewhat resembling white-of-egg, a substance peculiar to scrophulous abscesses, no one can doubt, that the complaint is connected with this constitutional affection. (See *Lumbar Abscess*.) The chronic enlargement of the thyroid gland, is by many considered as scrophulous; and, the opinion seems to be strengthened by the fact, that patients, with this affliction, very often have, at the same time, other complaints, which are unequivocally strumous. It might also be noticed, that this enlargement of the thyroid gland most frequently commences at an early period of life, like other scrophulous diseases; and, like them, is benefited by the mineral alkali. (See *Bronchocele*.) Scrophula also frequently makes its appearance in the form of imperfect suppurations, in various parts of the body; the contents of such abscesses being a curdy kind of matter, and the skin covering them, having an unhealthy red appearance, and a thickened doughy feel. The mesenteric glands are particularly often found universally diseased, and enlarged in scrophulous subjects; and, as all nutriment has to pass through these parts, before it can get into the circulation, we cannot be surprised at the many ill effects which must be produced on the system, when such glands are altered, and, no doubt, obstructed, in the way in which they frequently are. Scrophula also frequently makes its attack on the testicle. (See *Testicle, Diseases of*.) —The female breast not unfrequently becomes affected with scrophulous tumours, and abscesses.

The scrophulous inflammation (says Mr. Burns) is marked by a soft swelling of the affected part, which, very frequently is one of the lymphatic glands. The covering, or coat of the gland, becomes slightly thickened, and its substance more porous and doughy. The swelling increases, and the doughy feel changes by degrees into that of elasticity, or fluctuation, and a firm, circumscribed, hardened margin, can be felt round the base of the tumour. The skin is slightly red. If, at this time, an incision, or puncture, be made, either no matter, or very little, is evacuated, the lips of the wound inflame and open, displaying a sloughy-looking substance within; and, betwixt this and the skin, a probe can often be introduced for some way all round. If, however, the disease should have advanced further, then there is very little elasticity in the tumour; it is quite soft, rather flaccid, and fluctuates freely; the skin becomes of a light purple colour, and small veins may be seen ramifying on its surface. Some time after these appearances, the skin becomes thinner at one particular part, and here it also generally becomes of a darker colour. It afterwards bursts, and discharges a thin fluid, like whey, mixed with a curdy matter, or thick white flocculi. The redness of the skin still continues; but the aperture enlarges as the tumour subsides, and thus a scrophulous ulcer is produced. The margins of this kind of sore are generally smooth, obtuse, and overlap the ulcer; they are of a purple colour, and rather hard, and tumid. The surface of the sore is of a light red colour; the granulations are flabby and indistinct, and the aspect is of a peculiar kind, which, says Mr. Burns, cannot be described. The discharge is thin, slightly ropy, and copious, with curdy flakes. The pain is inconsiderable. When this ulcer has continued for some time, it either begins slowly to cicatrize, or, as more frequently happens, the discharge diminishes and becomes thicker. An elevated scab is next formed, of a dirty white, or yellowish colour. This continues on the part a good while; and when it falls off, leaves the place covered with a smooth purple cicatrix. Mr. Burns adds, that the preceding description corresponds to the mild scrophula, or the *struma mansueta*, of the old writers. This gentleman next remarks, that, occasionally, especially if a bone be diseased below the ulcer, the sore has a more fiery appearance, the surface is dark-coloured, the margins soft, elevated, and inflamed, and sometimes retorted. The discharge is watery, the pain very considerable, and the surrounding skin inflamed. This has been called the *struma maligna*. Such overacting scrophulous sores are most frequently met with over the smaller joints, particularly those of the toes. (*Burns*.) Sometimes a scrophulous abscess, after it has burst, forms a sinus; the mouth of which ulcerates, and assumes the specific scrophulous appearance, while the track of the sinus still

continues to emit a discharge. Mr. Burns also remarks, that scrophulous swellings are often disposed to subside in winter, and recur on the approach of summer; but, he adds, that this is not an invariable law. The glandular enlargements are very apt to become smaller, in a short time, in one place, while other glandular swellings originate with equal suddenness, somewhere in the vicinity of the former ones. Ulcers, also, very often heal, upon the appearance of the disease in other parts. (See *Dissertations on Inflammation, by John Burns, Vol.* 2, 1800.)

With regard to the proximate cause of scrophula, medical men may be said to remain, even at the present day, in entire ignorance. Of the exciting causes, very little is also known. Mr. John Hunter remarks, that "in this country, the tendency to scrophula arises from the climate, which is in many a predisposing cause, and only requires some derangement to become an immediate cause, and produce the whole disease." (*Treatise on the Venereal Disease, p.* 26.) In the same part of the work, this celebrated writer takes notice of slight fevers, colds, small-pox, and measles, exciting scrophulous diseases. He observes also, that, in particular countries, and in young people, there will sometimes be a predisposition to scrophula: and that, in such subjects, buboes will more readily become scrophulous. (P. 27.) In short, it was one of Mr. Hunter's opinions, and probably a most correct one, that the venereal disease is capable of calling into action such susceptibilities as are remarkably strong, and peculiar to certain constitutions and countries; and that, as scrophula is predominant in this country, some effects of other diseases may partake of a scrophulous nature. (P. 96.) Mr. Hunter, speaking of venereal buboes, mentions his having long suspected a mixed case, and adds, "I am now certain that such exists. I have seen cases, where the venereal matter, like a cold, or fever, has only irritated the glands to disease, producing in them scrophula, to which they were predisposed. In such cases, the swellings commonly arise slowly, give but little pain, and seem to be rather hastened in their progress, if mercury is given to destroy the venereal disposition. Some come to suppuration while under this resolving course; and others, which probably had a venereal taint at first, become so indolent, that mercury has no effect upon them; and, in the end, they get well of themselves, or by other means." (P. 269.) For such buboes, Mr. Hunter used to recommend sea-bathing; and, in case of suppuration, poultices made with sea-water.

It would be tedious and useless to expatiate on the many absurd notions, which have been entertained, concerning the proximate cause of struma. All that we need add in this work, is, that certain constitutions probably have a congenital disposition to the disease; that such diposition may probably be increased, or diminished, by the operation of climate, mode of life, age, &c.; and that irritations of a thousand kinds may excite the disease into action, when the system is predisposed to it, by inexplicable causes. That climate has great influence, cannot be doubted, when we reflect, that the inhabitants of certain countries, in which the temperature is invariably warm, never suffer from scrophula. There can also be no doubt that, with age, the disposition to scrophula diminishes; for, children, much afflicted while young, frequently get quite well when they approach the adult state; and, if a person has remained perfectly free from any mark of a scrophulous constitution, till the age of twenty-five, he may be considered as almost entirely exempt from the disease.

TREATMENT OF SCROPHULA.

"For the cure of scrophula, (says the celebrated Cullen,) we have not yet learned any practice that is certainly, or even generally successful. The remedy which seems to be the most successful, and which our practitioners especially trust to, or employ, is the use of mineral waters." "But, (adds this eminent physician,) in very many instances of the use of these waters, I have not been well satisfied, that they had shortened the duration of the disease more than had often happened when no such remedy had been employed. With regard to the choice of the mineral waters most fit for the purpose, (says Cullen,) I cannot, with any confidence, give an opinion. Almost all kinds of mineral waters, whether chalybeate, sulphureous, or saline, have been employed for the cure of scrophula, and, seemingly, with equal success and reputation; a circumstance, which leads me to think, that, if they are ever successful, it is the elementary water that is the chief part of the remedy. Of late, sea-water has been especially recommended, and employed; but, after numerous trials, I cannot yet discover its superior efficacy." Dr. Cullen next speaks of bark; but seems to consider its efficacy in scrophula, as very dubious and trivial. He mentions that, in several instances, the leaves of colt's-foot appeared to him to be successful. He used it frequently, in a strong decoction, and even then with advantage; but he found more benefit from the expressed juice, when the plant could be had in rather a succulent state, soon after its first appearance in the spring.

Dr. Cullen observes, that he had frequently employed the hemlock, and sometimes found it useful in discussing obstinate swellings; but, that it also frequently disappointed him, and he never remarked that this medicine disposed scrophulous ulcers to heal. The sentiments of Cullen are decidedly against the use of antimony, and mercury, in scrophulous cases. (See *First Lines of the Practice of Physic, Vol.* 4.)

Dr. Fordyce extolled bark for its efficacy in scrophulous diseases; he endeavours to prove, by some cases which are adduced, that, in cases of tumefied glands, attended with a feeble habit, and a weak circulation, it is a most efficacious medicine, and acts as a resolvent and discutient. He also brings forward a case, in support of bark being a means of cure for the ophthalmia strumosa. (See *Med. Obs. and Inq. Vol.* 1. *p.* 184.) Dr. Fothergill, in the same work, p. 303, writes in favour of the good effects of bark in similar cases; the latter sometimes gave, at the same time, small doses of calomel.

Mr. Burns remarks, that bark has been frequently found useful in the cure of scrophulous inflammation, but more often of ulceration, than tumefaction of the glands. But, adds this gentleman, it does not appear to possess, by any means, that certain power of curing scrophulous affections, which is attributed to it by Dr. Fothergill and several other authors. He observes, that we are not to suppose, that it will infallibly cure scrophulous inflammation, or ulceration of parts which, even when affected with simple inflammation, are very difficult of cure. If it be difficult to cure a simple inflammation, or ulceration, of a tendon, cartilage, or bone, we must not be disappointed if even a specific remedy for scrophula (were such ever discovered) should prove ineffectual in procuring a speedy restoration to health. Mr. Burns contends, that bark is often ineffectual, because improperly administered. Given in small quantities, once or twice a day, it may prove a stomachic, and increase, like other tonic bitters, the power of the stomach, or the functions dependent on it; but, in order to obtain the benefits of the specific action of bark, he maintains, that it should be given in large quantities, for several weeks, with a good diet, air, and proper exercise.—(*Dissertations on Inflammation, Vol.* 2. *p.* 371.)

As far as I can judge, Mr. White has, with much reason, recommended paying attention to such circumstances as may have effect in preventing the disease, viz. air, cleanliness, exercise, and diet. He mentions cold bathing among the preventives of struma, and speaks of sea-bathing as being the best. He advises attention, also, to be paid to the manner of clothing children, keeping them more covered in winter than summer. Mr. White thought, that allowing children to sleep a great deal was prejudicial; but, this seems to me only conjecture.

In noticing the treatment of the disease, Mr. White states, that "the general idea of the struma is, that it is a disease of debility; and therefore, the great object is, to invigorate the habit by every possible means; the chief of which are tonic medicines, and sea-bathing. Some are of opinion, that in the case of young patients, this should be continued, during the summer months, every year, to the age of fourteen or sixteen. Many recommend it, not only in the summer, but throughout the year: whilst others are for administering alteratives, principally the alkaline salts, with or without antimonials, and the different tonics, during the winter; and the sea-water, and sea-bathing, or cold-bathing, during the summer, for a continuance of two or three years from the commencement of the disease; with this general observation, that they will outgrow the complaint." Mr. White adds, that the chief external means are fomentations of sea-water, and cataplasms, made with the same. With respect to regimen, some recommend a milk and vegetable diet; others animal food, and fermented liquors.

Mr. White maintains, that the preceding plans of treatment are not, in general, efficacious, though in some instances, they may prove useful. "In early affections of the lymphatic glands, (says this gentleman,) and from the want of a pure air, and proper exercise, where children are delicate and irritable, a change of situation to the sea-side, together with bathing, when they have acquired some strength, must be exceedingly proper; and, in gross plethoric subjects, who have diseased lymphatics, from improper feeding, and want of necessary exercise, a journey to the sea-coast may be very useful, particularly if the salt-water is drank often, and in a sufficient quantity to become purgative. This, with the novelty of their situation, which may naturally produce an increase of exercise, might answer every expectation; but, these are the kind of cases that, with a very little attention, are easily cured." (*White on the Struma, Edit.* 3. *p.* 104.)

The conclusion to which Mr. White's remarks upon this part of the subject tend, is, that sea-bathing only deserves praise, as a preventive, and in the early stages of the disease. He particularly condemns cold-bathing, for poor, weakly, debilitated children, whose thin visage, enlarged belly, and frequent tickling cough, sufficiently indicate diseased viscera; such

do not recover their natural warmth, after cold-bathing, for hours, and their subsequent head-ach, livid lips, and pale countenance, are sufficient marks of its impropriety. (*P.* 107.)

"Cold-bathing, especially cold sea-bathing (says Mr. Russell) is a remedy universally employed in scrophula, and I believe with great advantage in many cases; for it not only appears to improve the patient's general health and strength, but likewise to promote the detumescence of enlarged glands, and the resolution of indolent swellings in the joints, even after they have attained a considerable size, and have existed for a great length of time. But, in order that cold-bathing may be practised with safety, and advantage, the constitution must have vigour to sustain the shock of immersion without inconvenience. If the immersion be succeeded by a general glow over the surface of the body, and the patient feels cheerful, and has a keen appetite, we may conclude that he agrees with the cold bath; but if he shivers on coming out of the water, continues chill, and becomes drowsy, we may be assured that the practice of cold-bathing does no good, and had better be omitted.

"In estimating the comparative merit of cold-bathing and warm-bathing, in the cure of scrophulous complaints, my own experience, together with the result of different conversations on the subject with some of the most judicious practitioners of my acquaintance, would lead me to bestow much more commendation on the effects of warm-bathing. I should not even be inclined to circumscribe the practice to cases of emaciation and debility, since from observation, I am fully satisfied with regard to the beneficial effects of the warm bath to patients of plethoric constitutions, who were much affected with swelled scrophulous glands. Several of those instances occurred in young women, about the prime of life, who were in all respects healthy and vigorous, abating the swellings of the glands, and those symptoms of distress which were connected with fulness of blood.

"The sensation of the warm bath is exceedingly grateful to most patients, and the practice is universally safe. It may be employed at all seasons of the year, and in all weather, without danger or inconvenience; the risk of suffering from exposure to cold, immediately after immersion in the warm bath, having been much magnified by prejudice. There is not even any good reason to believe in the existence of such a risk. The precautions, however, which are employed to avert it, are perfectly innocent; and, provided they do not impose any unnecessary and incommoding restraints upon the practice, may be encouraged, so far as to relieve the patient's mind from uneasiness and groundless apprehensions.

"It requires many weeks, and sometimes several months, to ascertain the full effects of warm-bathing in relieving scrophulous complaints; but, as the practice is not attended with any inconvenience, nor followed by any bad consequence, there can be no reason to intermit the course, till the trial is completely satisfactory: and I am convinced, that the practice of warm-bathing, in cases of scrophula, will be more universally adopted, after the knowledge of its beneficial effects is more widely diffused." (See *Russell's Treatise on Scrophula.*)

With regard to electricity, Mr. White thinks it is useful, when from length of time the enlarged glands have acquired a degree of hardness and insensibility.

Mr. White, after enjoining attention to air, exercise, and diet, as promotive of a recovery, as well as preventive of the disease, proceeds to explain his own practice. The internal cases, which properly belong to the physician, we shall dismiss from consideration. The first external symptoms, such as swellings of the lips, side of the face, and of glands under the chin, and round the neck; also, other symptoms, usually considered as strumous, viz. roughness of the skin, eruptions on the back of the hand, and different parts of the body, redness, and swelling of the eyelids, and eyes; are accompanied, according to Mr. White's conceptions, with an inflammatory diathesis, though seldom such a one, as to require bleeding. Calomel is the medicine, which this gentleman recommends for the removal of the foregoing complaints. It is not to be given in such quantities, as to render it a powerful evacuant, either by the intestines, or any other way; but, in small doses, at bed-time. Thus, says Mr. White, "it remains longer in the intestinal canal, a greater quantity is taken into the habit, and the patient is less susceptible of cold, than when taken in the day-time. The first, and, perhaps, the second dose may prove purgative, which is, in general, a salutary effect; but, afterwards, the same quantity will seldom do more, than is sufficient to keep the body open; and should it fail of answering that purpose, I have usually recommended some gentle purgative, every third or fourth morning, according to circumstances. If there should be a prevailing acidity, a few grains of the sal sodæ, magnesia, or some testaceous powder, may be added to the medicine. By this simple method (continues Mr. White) most of the symptoms

before-mentioned, will, in a short time, disappear; but if the tumours should continue hard, and retain their figure, without dividing into smaller ones, we may derive some benefit from external applications, particularly the steam of warm water. I have used a variety of medicinal herbs with success; but, am inclined to believe, that the advantage was principally derived from the warm water, &c. At other times, I have stimulated the part affected by electricity, insulating the patient, and drawing sparks from the tumour, until a slight degree of inflammation was excited. After the application of the steam, or the use of the electrical machine, I have sometimes rubbed a little of the unguentum mercuriale into the tumour, and neighbouring parts, or applied the emplastrum saponaceum, or mercuriale cum ammoniaco, over the swelling, or a liniment with camphor, ol. olivarum, and sp. terebinth." Mr. White adds, that in such cases, if the tumours should suppurate, and burst, the parts will, in most instances, heal without much trouble. For eruptions on the head, he recommends applying the ung. saturn. album camphoratum, or the cerat. alb. cum hydrarg. præcip. alb. For the roughness of the skin, which is generally followed by eruptions, he also advises the aqua-vegeto-mineralis, aqua calcis, solutions of sal. tartar. or of the hydrarg. mur. as outward applications. "This last (says Mr. White) will seldom fail to check the progress of the complaint, and dry the sores; and in the quantity of ten or twelve grains, to a quart of warm water, the use of it will not be productive of any pain. If the eruption should ulcerate, and require any unctuous application, to prevent the adhesion of the linen, the ointment beforementioned may be applied; the best remedy will be warm-bathing, and when practicable, the sea-water claims a preference." (*P.* 114.) The author next mentions his having occasionally recommended the vinum antimoniale, tartarum emeticum, decoctum Lusitanicum, decoctum lignorum, or sarsaparillæ; and that he sometimes found advantage derived from artificial drains. We need not detail this gentleman's mode of treating affections of the eyelid, as the reader may find all the necessary instruction, concerning scrophulous diseases of the eye and eyelids, by referring to *Ophthalmy* and *Psoroph thalmy.*

For the cure of indurations in the breast, remaining after mammary abscesses, Mr. White speaks very highly of the effects of the steam of warm water; and cautions us against indiscriminately employing calomel, which will often affect the mother little, but the child violently. Mr. White mentions his employing a small tin machine, large enough to hold a pint and a half, or two pints of boiling water. From the top proceeded a narrow tube, ten, or twelve inches long, through which the steam passed. Near its end, which was moveable and curved, was a joint, for the greater convenience of directing the steam to the diseased parts. The water was easily kept boiling, by means of a lamp under the machine. Mr. White says, that the steam should be employed twice, or thrice a day, and a piece of flannel, or skin, afterwards applied. The body should also be kept open. In obstinate, neglected cases, mercurial preparations, according to Mr. White, must likewise be given, and, if they affect the child much, suckling should be suspended. (*P.* 117, 118.)

Mr. White treats largely of the treatment of cases, in which the mesenteric glands are diseased; but, this subject strictly belongs to the physician. When, in these instances, the glands of the neck, or other parts of the body, tend to a state of suppuration, it is very slowly, the skin appearing uniformly thin, and of a deep red colour, and the tumour seeming flaccid. In such cases, Mr. White recommends the use of the lancet or caustic; for, if no artificial opening is made, it will be a long time, before the skin gives way; and, when it does, the aperture will not only be very small, but often unfavourable in its situation. Mr. White adds, that the contents will often be more like mucus, than pus, or like a mixture of both; and the discharge will continue for a great length of time, if no remedy is applied. This gentleman mentions his having found a solution of gum myrrhæ in aqua calcis, used as a lotion, and the ceratum saponaceum, or some similar outward application, the best method of treating this symptom.

We need not describe Mr. White's practice in the treatment of scrophulous joints, as the subject is fully considered in the article *Joints.* It appears, however, that he confirms the efficacy of stimulating applications, and pressure with bandages, when the fingers and toes are affected with strumous disease. (*P.* 143.)

Dr. Crawford, M. Pinel, and others, have tried the muriated barytes, as a remedy, in scrophulous cases. (*Med. Communications, Vol.* 2. *Nosographie Philosophique, Vol.* 2. *p.* 238.) Mr. Burns says, that the muriate of barytes has no effect on diseased glands; but, that it is occasionally serviceable in scrophulous ulceration, though, he adds, that it deserves little dependence. (*Dissert. on Inflamm. Vol.* 2. *p.* 372.) This gentleman recommends the following formula: ℞. *Terræ Ponder. Salit. Chryst. gr.* x. *Aq. Font. Aq. Cassiæ, utriusque,* ℥iij. *Syrup. Aurent.* ℥ij. Half an ounce of this may be given at first, twice or three times a day, and

gradually increased to such quantity, as the stomach can bear without sickness.

Fourcroy purposed trying the muriate of lime; but, its efficacy is very doubtful, and inconsiderable. "Professor Thomson (says Mr. Russell) has favoured me with the following observations on the effects of muriate of lime. He employed muriate of lime in various cases of scrophula, without having derived benefit from it in a single instance. Some patients, indeed, he admits, got well, while under a course of muriate of lime; but then he had no reason to ascribe the cure to the effect of the medicine. In other cases, on the contrary, the muriate of lime produced severe sickness and oppression at the stomach, and the patients got daily worse, till the muriate of lime was intermitted, and other medicines employed. The relief, experienced from the intermission of the muriate of lime, left, no doubt, with regard to the injurious effects, which the use of it had produced; and from extensive experience and accurate observation on the subject, Professor Thomson is satisfied, that muriate of lime is attended with prejudicial effects in many cases of scrophula." (See *Russell's Treatise on Scrophula.*) The same may be said of iron given either alone, or joined with the fixed, or volatile alkali. Burnt sponge, millipedes, and kali vitriolatum, have all been extensively tried: the first of these is, in my opinion, sometimes useful in diminishing enlarged scrophulous glands: that it has this effect on bronchoceles, is indisputable.

The Marischal de Rougeres employed a remedy, composed of iron filings, muriate of ammonia, kali præparatum, &c. (*Journ. de Med. tom.* 40. *p.* 219.)

Fothergill praised cicuta and, perhaps, it is as good an internal medicine as can be tried; but, it is far from being generally efficacious. It is highly deserving of recommendation for irritable scrophulous ulcers.

With regard to mercury, we have already noticed, that calomel was much employed by Mr. White. Some have exhibited the sublimate; others the acetite of mercury. All these preparations have been at times conjoined with cicuta, antimony, &c. Calomel, is, perhaps, the best mercurial preparation in scrophulous cases; but, mercury, given internally with any view of exciting a salivation, is justly deemed hurtful by all the best practitioners. As an alterative, and an occasional purgative, it is undoubtedly, a good medicine for strumous patients.

Mr. Burns thinks the nitrous acid has some effect in promoting the suppuration of scrophulous glands, and tumours, and disposing ulcers to heal. He says, two, or three drams may be given every day, for a fortnight; but, if in this time, it should do no good, its employment ought to be discontinued.

The pills containing natron præparatum (see *Pilulæ,*) and the different soda waters, sold at the shops, have repute, for their good effects on scrophulous constitutions, and diseases.

Eight, or ten drops of the hepatized ammonia, given thrice a-day, are useful, according to Mr. Burns, in irritable strumous ulcers. The breathing of oxygen gas been proposed; but, of this plan I can say nothing myself.

Dr. Cullen mentions, that cold bathing seemed to produce more benefit, than any other remedy, which he had occasion to see employed. (*First Lines of the Practice of Physic, Vol.* 4.)

The local treatment, preferred by Mr. White, has been already described. I have only a few words to add, concerning this part of the subject. Dr. Cullen states, that, in his practice, he had very little success in discussing incipient scrophulous tumours by topical applications; and that a solution of the saccharam saturni, though sometimes useful, more frequently failed. Dr. Cullen found the aqua ammoniæ acet. not more successful. "Fomentations of every kind (says he) have been frequently found to do harm; and poultices seem only to hurry on a suppuration. I am doubtful, if this last be ever practised with advantage; for scrophulous tumours sometimes spontaneously disappear, but never after any degree of inflammation has come upon them; and, therefore, poultices, which commonly induce inflammation, prevent that discussion of tumours, which might otherwise have happened." Even when scrophulous tumours have advanced towards suppuration, Dr. Cullen thought, that hastening the spontaneous opening, or making one with a lancet, was hurtful.

With respect to ulcers, Dr. Cullen remarks, that escharotic preparations, of either mercury, or copper, have been sometimes useful in bringing on a proper suppuration, and thereby disposing the ulcers to heal; but, they have seldom succeeded, and more commonly, they have caused the ulcer to spread more. The escharotic, from which Cullen saw most benefit result, is burnt alum, mixed with some mild ointment. But, this celebrated writer gives the preference to keeping the sores continually covered with linen wet with cold water in the day-time, and some ointment, or plaster at night. Cullen says, that he usually found sea-water too irritating, and no mineral water better, than common water. (*First Lines of the Pract. of Physic, Vol.* 4.)

Formerly the extirpation of scrophulous tumours was advised; but, this method is now considered as, being for the most

part, injudicious, and unnecessary, with the exception of diseased joints, and a few other parts, which frequently require being amputated, for the sake of saving the patient's life. Certainly, no particular danger (generally speaking) would attend cutting out scrophulous glands, and tumours; the objections to the plan are founded on the pain of the operation; on the number of such glands frequently diseased; on their often subsiding either spontaneously, or by surgical treatment; on the operation doing no good to the general affection of the system, &c. When, however, a scrophulous testicle, breast, or joint, seriously impairs the health, and endangers life, the very existence of the patient demands the immediate removal of the diseased part. Wiseman relates, that he was in the habit of cutting out scrophulous glands, and tumours, with great success; but, for reasons, already alledged, most of the moderns think such operations in general at least unnecessary.

Caustics have been employed for the same purpose, instead of the knife; but, as they effect the object in view less certainly, more painfully and tediously, and cause extensive ulcers, they are disused by all the best surgeons of the present day.

Some authors have advised making issues, and keeping them open, in order to prevent any ill effects from healing scrophulous ulcers. Issues are certainly quite unnecessary for any purpose of this kind; but they are eminently useful as a part of the local treatment of scrophulous joints and abscesses, (as we have more particularly explained in the articles *Joints*, *Lumbar Abscess*, and *Vertebræ*.)

Mr. Burns notices, that issues have hitherto been chiefly used in diseases of the bones and joints; but, he adds, that it is reasonable to suppose, that they ought likewise to be useful in the cure of enlargements of the glands, and other scrophulous tumours, if inserted in the immediate vicinity of the part. The only objection to their use is the scar, which they leave, and which, in certain situations, one would particularly wish to avoid. When the tumour is thickly covered with the integuments, the issue may be made directly over it, and kept open with the savine ointment. In other cases, a small pea issue, or seton, may be inserted by the side of the tumour. This method would be objectionable, for scrophulous glands in the neck, in consequence of the scar; but, it might be employed, when the mamma is diseased. (*Dissertations on Inflammation*, *Vol.* 2.)

Preparations of lead; cloths dipped in cold water, sea-water, or weak vegetable acids; æther; sea-salt mixed with bile; the linimentum camphoræ; a mixture of æther and the linimentum opiatum; and hemlock poultices; form a long list of applications, which have been employed for scrophulous tumours.

According to Mr. Burns, moderate pressure, by means of adhesive plaster, conjoined with the application of cold water, is one of the best plans of treating mild scrophulous ulcers, when their situation admits of it. In other cases, he recommends applying a powder, five parts of which consist of cerussa acetata, and the sixth of burnt alum. A piece of dry lint is next to be applied, and a compress, with such pressure as can be used. Benefit occasionally results from dipping the compress in cold water.

The ceratum è lapid. calamin. is a good common dressing, when it is wished not to interfere much with the progress of the ulcer. The ung. hydrarg. nitrat. rub. and the ung. hydrarg. nitrat. are the best stimulating ointments. Poultices of bread and sea-water; solutions of alum, cuprum vitriolatum, and the hydrarg. mur.; solutions of the nitrates of copper, bismuth, and silver; the recent leaves of the wood-sorrel bruised; lint dipped in lemon juice, or vinegar and water; are among the applications to common scrophulous ulcers.

For irritable ones, diluted, hepatized ammonia; ointments containing opium: carrot and hemlock poultices; a solution of opium; and carbonic acid gas; are commonly recommended.

The following are Mr. Russell's sentiments respecting the treatment of scrophulous ulcers: "Scrophulous complaints in general do not agree well with stimulant applications. In the treatment of scrophulous ulcers, under the ordinary circumstances of complaint, the simplest and mildest dressings answer best. When the patients are using a course of sea-bathing, it is usual to wash the sores with sea water, over and above the momentary application of the sea water during the immersion of the whole body. Cold spring water is likewise a favourite application with many practitioners; and, from much observation, it appears that the operation of cold is well suited to counteract the state of inflammation, which accompanies scrophulous sores. Preparations of lead are, upon the whole, very convenient and useful applications, provided the solutions be used in a state of sufficient dilution to prevent irritation. Liquid applications are applied by means of wet linen, which is renewed whenever it dries, so that the surface of the sore may be kept constantly moist, when under this course of management. Upon the same principle, simple ointment and Goulard's cerate, furnish the best dressing in ordinary cases.

"Scrophulous congestions, of a solid nature, in the more external parts of the body, are little adapted to the practice of local bleeding, unless they be attended with symptoms of inflammation; but as some degree of inflammation is, in general, present during the incipient stage, it may be prudent to employ local bleeding in moderation at the commencement of the attack, although there may be no indication to persist in the practice, after the complaint has advanced farther in its progress. If, however, these congestions are more of an indolent nature, unaccompanied with heat or pain, there is no benefit to be expected from the local detraction of blood; warm fomentations, together with the use of stimulants, and a repetition of blisters, are the most serviceable class of remedies: such cases, too, are the best adapted to the use of friction as a discutient. Friction, indeed, has long been employed for this purpose; but, of late years, it has been introduced to an extent, and with an effect, far beyond the experience of all former practice. As yet, it has been circumscribed to the practice of a very few individuals, with whom it is said to have performed very great cures; and if, upon the test of more extensive experience, it is found to answer its present high character, I shall consider the use of repeated frictions to be one of the most valuable improvements which has been introduced into practice in modern times. The safety and simplicity of the practice recommend it very strongly to favour, though I am afraid they are the very circumstances which retard its adoption by the public in general. I only regret that I do not feel myself entitled to give a decided opinion upon the subject from my own experience, though I have known some instances of successful cures; but the reports of success are so numerous and so well supported, that I am inclined to think very favourably of the practice.

"There is no substance interposed between the surface of the swelling and the hand of the person who administers the friction, excepting a little flour, to prevent the abrasion of the skin. The friction is applied regularly two or three hours every day, with great celerity, the hand being made to move to and fro one hundred and twenty times in a minute, and the course may require to be continued without interruption, for some months." (See *Russell on Scrophula*.)

I shall not enlarge upon this endless subject, which still stands in need of elucidation, as much as any disease, that can be instanced. The scrophulous affections of the joints are explained in *Joints. Bronchocele; Lumbar Abscess*; and *Vertebræ*, are other articles, containing matter connected with the preceding observations.

With regard to sources of information, concerning scrophula, I profess myself totally unacquainted with any, which are even moderately respectable. The reader may consult *Wiseman's Chirurgical Treatises. Heister's Surgery. Cullen's First Lines of the Practice of Physic, Vol. 4. Ferne on the King's Evil. Cheyne on the King's Evil. B. Bell's Surgery, Vol. 5. B. Bell on Ulcers. Kirkland's Medical Surgery, Vol. 2. White on the Struma, Edit. 3, 1794. A. G. Kortum's Comment. de Vitio Scrophuloso, in 2 Vol. 4to. Lemgoviæ, 1789, London Med. Obs. and Inq. Vol. 1. Encyclopédie Méthodique, Art. Ecrouelles. Dissertations on Inflammation, by John Burns, Vol. 2. Crowther's Obs. on the Disease of the Joints, commonly called White Swelling; with remarks on Caries, Necrosis, and Scrophulous Abscesses, &c. Edit. 2, 1808. A Treatise on Scrofula, by James Russell, Edinburgh, 1808.* Of the preceding works, Cullen's First Lines, White's Treatise, Mr. Burn's Dissertation in Vol. 2, and Mr. Russell's Treatise, have been most useful to me, in the compilation of the present article.

SCROTOCE'LE. (from *scrotum*, and κηλη, a tumour.) A rupture, or hernia in the scrotum.

SCROTUM, CANCER OF. (*Chimney-Sweeper's Cancer. The soot-wart.*) Mr. Pott gives the following account of this peculiar disorder.

"It is a disease, which always makes its first attack on, and its first appearance in the inferior part of the scrotum; where it produces a superficial, painful, ragged, ill-looking sore, with hard and rising edges: the trade call it the soot-wart. I never saw it under the age of puberty, which is, I suppose, one reason why it is generally taken, both by patient and surgeon, for venereal, and being treated with mercurials, is thereby soon and much exasperated: in no great length of time, it pervades the skin, dartos, and membranes of the scrotum, and seizes the testicle, which it enlarges, hardens, and renders truly and thoroughly distempered; from whence it makes its way up the spermatic process into the abdomen, most frequently indurating and spoiling the inguinal glands: when arrived within the abdomen, it affects some of the viscera, and then very soon becomes painfully destructive.

"The fate of these people seems singularly hard: in their early infancy, they are most frequently treated with great brutality, and almost starved with cold and hunger; they are thrust up narrow, and sometimes hot chimneys, where they are bruised, burned, and almost suffocated; and when they get to puberty, become peculiarly liable to a most noisome, painful, and fatal disease.

"Of this last circumstance there is not the least doubt, though perhaps it may not have been sufficiently attended to, to make it generally known. Other people have cancers of the same parts; and so have others beside lead-workers, the Poictou colic, and the consequent paralysis: but it is nevertheless a disease to which they are peculiarly liable; and so are chimney-sweepers to the cancer of the scrotum and testicles.

"If there be any chance of putting a stop to, or preventing this mischief, it must be by the immediate removal of the part affected; I mean that part of the scrotum where the sore is; for, if it be suffered to remain until the virus has seized the testicle, it is generally too late even for castration. I have many times made the experiment; but though the sores, after such operation, have, in some instances, healed kindly, and the patients have gone from the hospital seemingly well, yet, in the space of a few months, it has generally happened, that they have returned either with the same disease in the other testicle, or in the glands of the groin, or with such wan complexions, such pale leaden countenances, such a total loss of strength, and such frequent and acute internal pains, as have sufficiently proved a diseased state of some of the viscera, and which have soon been followed by a painful death.

"If extirpation ever bids fair for the cure of a cancer, it seems to be in this case; but then the operation should be immediate, and before the habit is tainted. The disease, in these people, seems to derive its origin from a lodgment of soot in the rugæ of the scrotum, and at first not to be a disease of the habit. In other cases of a cancerous nature, in which the habit is too frequently concerned, we have not often so fair a prospect of success by the removal of the distempered part; and are obliged to be content with means, which I wish I could say were truly palliative: but here the subjects are young, in general in good health, at least at first; the disease brought on them by their occupation, and in all probability local; which last circumstance may, I think, be fairly presumed from its always seizing the same part: all this makes it (at first) a very different case from a cancer, which appears in an elderly man, whose fluids are become acrimonious from time, as well as other causes; or from the same kind of complaint in women who have ceased to menstruate. But be all this as it may, the scrotum is no vital organ, nor can the loss of a part of it ever be attended with any, the smallest degree of inconvenience; and if a life can be preserved by the removal of all that portion that is distempered, it will be a very good and easy composition; for when the disease has got head, it is rapid in its progress, painful in all its attacks, and most certainly destructive in its event." (*Pott's Works, vol.* 3.)

SEARCHING. The operation of introducing a metallic instrument, through the urethra into the bladder, for the purpose of ascertaining whether the patient has a stone, or not. See *Sounding*.

SE'DATIVES. (from *sedo*, to appease.) *Sedantia. Sedativa.* Medicines, which diminish irritability.

SEMICUPIUM. Strictly a bath for about one half of the body: medical men, however, now frequently mean by the term only a warm bath, especially, the slipper-bath.

SERPI'GO. (from *serpo*, to creep, because it gradually creeps over the surface of the skin.) A ring-worm, or tetter. See *Herpes*.

SETON. (from *seta*, a bristle, because horse-hairs were formerly used for keeping open the wound.) *Setaceum.* A kind of issue. It is usually made by means of a particular needle, which is of various breadths, from half an inch to a full inch. The needle is commonly a little curved, but, if straight, it would be better calculated for the purpose. From the point, to its broadest part, it is double-edged, and, behind, it has a transverse eye, through which a skein of thread, or silk, of exactly the same breadth as the needle, is placed.

A fold of skin is to be pinched up, at the part where the seton is designed to be made, and the needle is to be pushed through it, together with the skein of thread, which is to be dipped in sweet-oil. The instrument is not to be introduced too low into the base of the fold, nor too high, near its edge. In the first case, the muscles, and parts, which ought to be avoided, might be wounded; in the second, the interspace, between the two wounds, would be very narrow, and the seton soon make its way through it.

When no seton-needle is at hand, the fold of the skin may be punctured with a lancet, and the skein of thread introduced by means of an eye-probe. A seton may be applied almost to any part of the surface of the body, when circumstances require it; but, one of its openings should always be made lower, than the other, that the matter may readily flow out. The skein of thread is to remain untouched, for a few days after the operation, until the suppuration loosens it. Afterwards the part of the thread, nearest the wound, is to be smeared with oil, white cerate, or any digestive ointment, and drawn under the fleshy interspace between the two wounds, and what was there be-

fore is to be cut off. The seton is to be drawn in this manner once, or twice, a day, according as the quantity of matter may require. A new skein of silk, or thread, is to be attached to the preceding one, as often as necessary. Care is to be taken to keep the thread on the outside of the wound well covered, and free from the discharge, which would make it stiff and hard, and apt to occasion pain and bleeding on being drawn into the wound. If the discharge should be deficient in quantity, powdered cantharides may be mixed with the digestive ointment.

SIGHT, DEFECTS OF. There are persons, who, from their infancy, are incapable of distinguishing one colour from another. A man, who was affected with this infirmity, could not distinguish green at all. Green and red appeared to him the same. Yellow and blue he could discern very well. With regard to dark-red and dark-blue, he frequently made mistakes. In other respects, his vision was sound and acute. The father of this patient was afflicted with the same infirmity. The mother and one sister were free from it. Another sister and two of her children had it. The patient himself had two children, who did not labour under the disorder. (See *Phil. Trans. Vol.* 68, *Part* 2.) Another subject, whose eyes were in other respects healthy, and whose eyesight was sharp, could not distinguish a dark-green from a dark-red.

Sometimes, objects appear to the eye to be of a different colour from what they really are. This is occasionally owing not to the eye, but to the unclear and coloured light, by which the object is illuminated. Thus, for instance, a bad tallow candle, which emits a yellow flame, makes every thing appear yellow. When brandy is burning, all objects appear blue. In short, it is only by the light of the sun, that any object can be seen in its clear natural hue. In certain cases, the infirmity is owing to the transparent parts and humours of the eye, which do not happen to be of a proper colour. Thus, persons having the jaundice in a high degree, see all things yellow, because the transparent parts of the eye are of that colour. When, in consequence of external violence applied to the eye, blood is effused, and the aqueous humour rendered red by this fluid, all objects seem to the patient to be red; and, white, when the aqueous humour has been made of this colour by the couching of a milky cataract. Sometimes this defect in vision is ascribable to the duration of an impression. When one has surveyed a bright coloured object a long while, as for example a bright red or yellow wall, on which the sun shines, that colour will often remain a good while before the eyes, although one may not be looking any more at an object of this hue. There are some eyes, which seem much disposed to retain the impression of objects, which are not very bright coloured; but, such a disposition always betrays great weakness and irritability of those organs. The most frequent cause of this defect in vision, is an irritation operating upon the optic nerves, so as to produce the irritability in them, which alone makes objects appear of one colour. The seat of such irritation, according to Richter, is also most commonly in the abdominal viscera, and the case demands evacuations, tonics, and anodyne medicines. But, the disorder may also originate from other causes. The operation of bright-coloured or shining objects upon the eye, sometimes has this consequence, that, for a certain time afterwards, objects of diverse colours appear to be moving before the eyes. In extreme terror, or fright, things may also seem to have a different colour from their real one. The same often happens in fevers attended with delirium. A sudden exposure of the head to cold, at a period, when it was perspiring much, in one instance, caused many coloured appearances before the eyes; but, the disorder subsided in a couple of days. (*Richter's Anfangsgr. der Wundarzneykunst, Band.* 3, *p.* 523.)

Also a healthy eye sees a distant object with uncertainty, and error, in a room, or space, the extent, length, and breadth, of which are unknown, when the size of the object itself is unascertained, and when there are few or no other objects intervening at a smaller distance between the eye and the thing looked at. The more numerous the objects are between the eye and the principal thing looked at, the more distant it is made to appear; the fewer they are, the nearer it seems to be. In a country covered with snow, and upon the sea, very distant objects appear to be close. The smaller an object is to the eye, in relation to its known magnitude, the further off it seems. The errors, which the eye makes, in regard to the distance of objects, also tend to deceive. But, there are certain cases, in which the eye is almost entirely incapable of judging of the distance of objects. The first is, when the object, of which we wish to ascertain the distance, is looked at with only one eye. Hence all one eyed persons, and persons affected with strabismus, are unable to judge well of the real distance of objects. However they are only so for a certain time; and, by practice, they gradually acquire the faculty. Even when two eyes are employed, it requires some exercise, in order to enable them to judge of the right distance of objects. Persons, born blind, but who have their sight restored in both eyes by the

operation for the cataract, are a long while incapable of judging of distances, and only obtain this power very gradually. Lastly, this infirmity is sometimes owing to an irritation affecting the optic nerves, whereby their sensibility is so altered, that distant objects make the impression upon them of near ones. In this circumstance, all objects appear to the patient closer than they really are. This is the only case, which admits of being treated as a disease. The irritation, producing the disorder, is mostly seated in the abdominal viscera, and requires evacuations and such medicines as invigorate the nerves. A suppression of the perspiration is alledged to be sometimes a cause. (*Richter's Anfangsgr. der Wundarzn. Band.* 3, *p.* 525.)

A sound eye likewise does not always judge with accuracy and uniformity of the magnitude of objects. This may arise from three causes. In order to judge rightly of the size of any thing, its precise distance must be known; for, the more remote it is, the smaller will it seem to the eye. Hence, any conjecture, respecting the magnitude of an object, is constantly erroneous, unless the distance be ascertained. Size is invariably something relative. A single large object, surrounded by many small ones, always appears to be larger, than it really is; et vice versâ. An object, whose magnitude is known, seems smaller, than it actually is, when one has been a little previously looking at another that is still larger. Lastly, the refraction of the rays of light in the eye, by which operation an object is made to appear large or small, is not always accomplished in the same degree, as the eye is not at all times equally full and distended with its humours. Hence, at one time, the same object will appear to the same eye, and at the same distance, larger; at another time, smaller. Sometimes, however, the eye judges so erroneously of the magnitude of objects, that there is reason for regarding the case as an infirmity, or disease. It is for the most part owing to a defective sensibility in the nerves, caused by some species of irritation acting upon the eye, and generally seated in the gastric organs. A man, to whom every thing seemed one half smaller and nearer, than it really was, was cured by means of an emetic, bark, an issue, and valerian. (*Leutin, obs. fascic.*)

Sometimes to the eye, under circumstances of disease, straight lines appear serpentine; perpendicular objects, sloping, things standing upright, to be inverted, &c. All these cases are set down by Richter as depending upon a wrong sensibility of the nerves, occasioned by the effect of some irritation. The irritation, he says, may be of many kinds; but, experience proves, that it is mostly seated in the gastric organs. These defects of sight may generally be cured by first exhibiting emetics and purgatives, and afterwards having recourse to remedies for strengthening the nerves, bark, oleum animale, valerian, issues, &c. One mark of a very weak and irritable eye, is when objects, after being looked at a good while, and presenting a right appearance, begin to move, swim about, mix together, and, at length, become quite indistinguishable. This principally happens when the objects regarded are small and strongly illuminated. Here such remedies, both general and topical, as have the effect of invigorating the nerves, are indicated. However, sometimes, the infirmity is partly owing to the operation of some species of irritation, which will require removal, ere the tonic medicines and applications can avail. Indeed, in particular cases, the dispersion of such irritation is alone sufficient to accomplish the cure.

Sometimes, all objects appear to the eye, as if they were in a more or less dense mist. This defect in vision is always owing either to some slight opacity of one of the humours of the eye, or to excessive debility of the optic nerves. (See *Richter's Anfangsgr. der Wundarzn. Band.* 3, *p.* 521, *&c.*)

SINGU'LTUS. (*à sono vocis*, from its peculiar noise.) The hiccough.

SINUS. (a gulph, from κενος, void.) This term in surgery means a long, narrow, hollow track, leading from some abscess, diseased bone, &c.

SIPHILIS. (from σιφλος, filthy.) The venereal disease. (See *Venereal Disease.*)

SOLUTIO ARGENTI NITRATI.—℞. *Argenti Nitrati* ʒj. *Aq. Distillat.* ℥ss. *M.* This is a very good application for sores, which are frequently met with round the roots of the nails, both of the fingers and toes. It is also useful in herpetic affections, noli-me-tangere, and several kinds of ulcers. The proportion of the argentum nitratum may be lessened, or increased, as occasion requires. A strong solution of this substance is a good application for destroying warts, to which it must be applied by means of a hair-pencil. When used for sores, it is best to dip little bits of soft lint in it, lay them on the part affected, and cover them with a common pledget.

SOLUTIO FERRI VITRIOLATI.—℞. *Ferri Vitriolati ad albidinem calcinati* ʒj. *Aq. Distillat.* ℥viij. *Misce.* Has been recommended as an application for sores on the nipple, and other ulcers.

SOLUTIO HYDRARGYRI CUM PLUMBO.—℞. *Hydrarg.* ʒij. *Plumbi* ʒiss. *Acidi Nitrosi* ℥j. The two metals are to be dissolved in the acid, in a glass vessel,

placed in a sand heat. Plenck employs this caustic solution for destroying warts, and excrescences.

SORDI'TIES. (from *sordeo*, to be filthy.) Putrid pus of bad quality; any fetid discharge.

SOUND. An instrument, which surgeons introduce through the urethra into the bladder, in order to discover, whether there is a stone in this viscus, or not. The sound is usually made of very highly polished steel, that it may be well calculated for conveying to the surgeon's fingers the sensation of any thing, against which its end may strike. It is also generally rather less curved, than a catheter, so that its extremity may be more easily inclined to the lower part of the bladder, where the stone is most frequently situated.

SOUNDING. The operation of introducing the foregoing instrument.

Sounds are generally introduced much in the same way as catheters, either with the concavity towards the abdomen, or the convexity, in which last method, it is necessary, as soon as the beak of the sound has arrived in the perineum, to bring the handle of the instrument downward by a semicircular movement to the right, while the other end is kept as much fixed as possible. This is what the French term the coup, or tour de mâitre; a plan, that is often followed at the present day, though, except in very corpulent subjects, it has no particular recommendation.

When a patient is to be sounded, he is usually put into a posture very similar to that adopted in the lateral operation for the stone, with the exception that he is not bound in this position, as there is sometimes an advantage in being able suddenly to alter it, in order that the stone may thereby be made to come into contact with the end of the sound. The instrument having been introduced, its extremity is to be turned, and moved in every direction within the bladder, when, if there be a calculus, its presence will usually be indicated by the collision against the beak of the sound.

SPARGANO'SIS. (from σπαργαω, to swell.) An enlargement of the breast from a redundancy of milk: the mammary abscess.

SPA'TULA. (dim. of *spatha*, a broad instrument.) An instrument for spreading salve.

SPECILLUM. (from *specio*, to examine.) A probe.

SPE'CULUM. An instrument intended for facilitating the examination of parts, and also operations on them: thus we have specula ani, specula oculi, auris, &c.

SPERMATOCE'LE. (from σπερμα, and κηλη, a tumour.) The old writers seem to signify, by this term, a swelling caused by a stagnation of the semen. I am acquainted with no real disease, which answers to any meaning of this kind.

SPHACELI'SMUS. (from σφακελιζω, to mortify.) A mortification.

SPHA'CELUS. (from σφαζω, to destroy.) Surgeons imply, by this word, complete mortification, which is mostly preceded by a stage of the disorder, termed *gangrene*. See *Mortification*.

SPICA. (from σπαχυς, an ear of corn.) A name, given to a kind of bandage, in consequence of its turns being thought to resemble the rows of an ear of corn. Of spica bandages there are several kinds: but, we shall here only mention a few.

In order to apply the spica bandage, employed in dislocations of the shoulder, we are to take a common single-headed roller, and place the end of it under the opposite arm-pit. After conveying the bandage backward, obliquely over the shoulders, we are then to bring it forward over the head of the dislocated bone. The roller is next to descend under the arm-pit, then be carried upward again, and made to cross on the deltoid muscle. The roller is now to be carried obliquely downward over the front of the chest, and under the opposite arm-pit, where the end of it is to be pinned, or stitched. The bandage is next to pass across the back, over the part of the roller previously applied in this situation, and is to be conveyed round the head of the os brachii, so as to form a turn, or *doloire*, with the first circle of the roller. Three, or four *doloires*, or turns, each of which covers about one-third of the preceding one, are to be made, and then the upper part of the arm is to be once surrounded with a plain circle of the bandage. This last circular application leaves between it, and the cross previously made, a triangular, equilateral, space, technically named by writers *geranis*. The roller is now to be carried upward in a spiral manner; its head is to be brought to the opposite arm-pit, and the application of the whole concludes with a few turns round the body. The bandage is to be fastened with pins at the place, where it commenced.

Before putting on the spica, the injured part, and margin of the axillæ, must be guarded from the effects of the pressure by compresses.

The spica bandage for the broken clavicle is applied in the same manner, with the exception, that the crossings are made over this bone. It is proper to state in this place, that the spica is a very ineffectual bandage for this kind of case. (See *Fractures of the Clavicle*.)

In order to apply, what is named, the *spica inguinis*, the end of the roller is to be placed on the spine of the os ilium, of the

affected side. The bandage is then to be carried obliquely over the groin, and under the perinæum. Then it is to pass over the back of the thigh, and next forward, so as to cross the part previously applied on the front of the groin. The application is continued by carrying the roller over the pubes, over the opposite os ilium, and next round the body above the buttocks. The bandage thus returns to the place, where it began. Its application is completed by making a few doloires, and turns, like the preceding ones, and lastly, a few turns round the body.

The spica for the thigh is applied in the same way; only the crossings are to be made on the upper and outer part of the limb. (See *Encyclopédie Méthodique, Part. Chirurgicale, Art. Spica.*)

SPINA BIFIDA. (i. e. the Cloven Spine.) *Hydro-Rachitis.* A disease, attended with an incomplete state of some of the vertebræ, and a fluid swelling, which is most commonly situated over the lower lumbar vertebræ, sometimes over the dorsal and cervical ones, and, in some instances, over the os sacrum. The same name has also been given to an analogous tumour, which sometimes occurs on children's heads, attended with an imperfect ossification of some part of the cranium.

The Arabians, who first treated of this disease, erroneously imputed the deficiency of one, or more of the spinous processes to the tumour, while it is now well known, that the incomplete state of the affected vertebræ is a congenital malformation, and that the swelling is only an effect. In fact, the tumour generally becomes larger and larger, the longer it continues. The spina bifida may be regarded as an affliction only met with in children: few, very few, live to the adult age with this incurable affection. Warner, however, has related a case, in which the patient lived till he was twenty.—(*Cases in Surgery, p.* 134, *Edit.* 4.)

As I have remarked, the swelling is most frequently situated towards the lower part of the spinal canal, particularly at the place, where the lumbar vertebræ join the sacrum. The fluid, which it contains, resembles serum, being somewhat more liquid, than the white-of-egg, and, like the latter, frequently coagulable. It is in general limpid and colourless; but, occasionally, it is turbid, and tinged with blood. On pressing the tumour, a fluctuation is very perceptible, and a preternatural space may also be felt existing between some of the spinous processes. The fluid is contained in a kind of cyst, which is composed of the continuation of the dura mater, investing the spinal canal, and is usually closely adherent to the integuments.

Spina bifida is sometimes attended with hydrocephalus. It has even been recorded, that the enlargement of the head has undergone a considerable diminution, when the tumour of the spine casually burst, and discharged the fluid, which it contained; a proof of some communication between the two parts. (*Ephem. Cur. Nat. Decad.* 3, *An.* 1, *Decad.* 2, *Art.* 2.) The fluid, which was lodged in the lateral ventricles, and third ventricle, passed into the fourth, through the aquaductus Sylvii, ruptured the calamus scriptorius, and thus got into the spinal canal.

Spinæ bifidæ usually occur on the lower part of the spine; but, they occasionally take place on the cervical vertebræ, in which latter situation, the tumours have the same characteristic marks, as those which form near the sacrum. Many facts, recorded by Ruysch, in his Anatomical Observations, confirm the preceding account.

The present affliction is one of a most incurable nature: at least, (with the exception of two or three recently published by Mr. Astley Cooper,) there is not, I believe, in all the records of medicine, or surgery, any case, which either got well of itself or was benefited by any mode of treatment. Opening the tumour, either with caustics, or cutting instruments, has hitherto only tended to hasten the fatal event of the disease. Death soon follows an operation of this kind, and, it is said, that the child sometimes dies immediately. Tulpius observes on this subject: *quam calamitatem si quidem reformides, chirurge, cave sis improvide operias quod tam facilè occidit hominem.* Observ. Med.

But, whether the tumour be opened, or not, still the disease is one of the most fatal, to which children are exposed. When afflicted with it, they very seldom live till three years of age: but, after lingering several months from their birth, suddenly die. It has been said, that children, with spina bifida, always have their legs in a paralytic state. This, however, is not true; for, the largest spina bifida I ever saw, was under my friend Mr. Maul, now resident at Southampton, and was unattended with any weakness of the legs. Indeed, the child was, to all appearances, as stout, healthy, and full of play, as possible. The fatal event, however, took place after a time, as usual; and, if my memory does not fail me, Mr. Maul noticed, that a little before death, a remarkable subsidence of the swelling occurred, though it never burst externally. It is a fact, notwithstanding, that many infants, with spina

bifida, have paralytic legs, and can neither retain their feces, nor urine.

If we draw our inferences from the cases, and remarks, offered by almost every writer on spina bifida, we must regard all attempts to cure the disorder, by making any kind of opening, as exceedingly perilous, if not positively fatal. It is to be observed, at the same time, that some very eminent surgical authors have not altogether abandoned the idea of devising a mode of accomplishing a cure, at least, in a few instances. Mr. B. Bell says, that if the tumour proceeded from disease of the spinal marrow, or its membranes, no means of cure will probably ever be discovered. But, if the deficiency in the spinous processes of the vertebræ, with which the disease is always accompanied, is not an effect of the complaint, as was commonly imagined, and if the collection of fluid takes place from the want of resistance in the dura mater, in consequence of the imperfection of the bones, Mr. B. Bell questions, whether it would not be proper to tie the base of the tumour with a ligature, not merely with a view of removing the swelling, but in order to resist the propulsion of the cyst further outward. Mr. Bell acknowledges, that the event of this practice must be considered as very dubious; but, expresses his wish to devise any plan, that would afford even the least chance of success, in a case which must terminate in an unfavourable manner. Mr. Bell mentioned his design of putting the method to a trial, on the first opportunity, and after the detachment of the swelling on the outside of the ligature, he intended to keep a soft compress on the part with a proper bandage. I do not know whether this gentleman ever put the above scheme in practice; but, suppose not. It is properly objected to by the author of the article *Spina Bifida*, in the *Encyclopédie Méthodique, Part. Chir.* because the disease is often attended with other mischief of the spinal marrow and brain, and the base of the swelling is almost always too large to admit of being tied at all, or not without hazard of dangerous consequences.

Richter has proposed the trial of two caustic issues at a little distance from the swelling; but, I am not acquainted with any facts in favour of this practice.

Mr. Abernethy first suggested trying a gentle degree of pressure on the tumour from its commencement, with a view of producing absorption of the fluid, and preventing the distention of the unsupported dura mater. Were the fluid to continue to increase, notwithstanding such pressure, Mr. Abernethy thinks, that as death would be inevitable on the tumour bursting, it might be vindicable to let out the fluid, by means of a puncture, made with a finely-cutting instrument. The wound is to be immediately afterwards closed with sticking plaster, and, if possible, healed. Another accumulation is then to be prevented, if practicable, with bandages and topical applications. Mr. Abernethy actually made the experiment of trying a puncture in one hopeless instance, in which indeed, the swelling had previously just begun to burst. The puncture was repeated, every fourth day, for six weeks, during which time the child's health continued unaffected. The wounds were regularly healed; but the plaster having been rubbed off one of the punctures, the part ulcerated, the opening could not be healed, the discharge, from having been of an aqueous quality, became purulent, and death ensued. This case was unfavourable for the trial of the method, as the integuments covering the tumour were diseased, and had no disposition to contract.

The annexed case, published by Mr. Astley Cooper, will serve to shew the benefit, which may be derived from pressure.

"James Applebee, Baldwin Street, Old Street, was born on the 19th of May, 1807, and his mother, immediately after his birth, observed a round and transparent tumour on the loins, of the size of a large walnut.

"Mr. Deering, who was her accoucheur, requested Dr. Petch to see the child with him, who informed the mother of the dangerous nature of the complaint, and of the probability of its fatal termination.

"On the 22d of June, 1807, the child was brought to my house, and I found, that although it had spina bifida, the head was not unusually large; that the motions of its legs were perfect; and its stools and urine were discharged naturally.

"I applied a roller around the child's waist, so as to compress the tumour, being induced to do so from considering it as a species of hernia, and that the deficiency of the spine might be compensated for by external pressure.

"The pressure, made by the roller, had no unpleasant influence on its voluntary powers; its stools and urine continued to be properly discharged, but the mother thought, that the child was occasionally convulsed.

"At the end of a week, a piece of plaster of Paris, somewhat hollowed, and that hollow partly filled with a piece of lint, was placed upon the surface of the tumour: a strap of adhesive plaster was applied to prevent its changing its situation, and a roller was carried around the

waist, to bind the plaster of Paris firmly upon the back, and to compress the tumour as much as the child could bear.

"This treatment was continued until the month of October, during which time, the tumour was examined about three times a week, and the mother reported, that the child was occasionally convulsed.

"When the child was five months old, a truss was applied, similar in form to that, which I sometimes use for umbilical hernia in children, and this has been continued ever since.

"At the age of fifteen months, it began to make use of its limbs; it could crawl along a passage, and up two pair of stairs.

"At eighteen months, by some accident, the truss slipped from the tumour, which had become of the size of a small orange, and the mother observed, when it was reduced, that the child appeared in some degree dull; and this was always the case, if the truss was left off for a few minutes, and then reapplied.

"At fifteen months, he began to talk; and at two years of age, he could walk alone.

"He now goes to school, runs, jumps, and plays about, as other children. His powers of mind do not appear to differ from those of other children. His memory is retentive, and he learns with facility. He had the measles and small-pox in the first year, and the hooping-cough at three years. His head, previously and subsequently to the bones closing, has preserved a proper proportion to the other parts of the body.

"The tumour is kept by the truss entirely within the channel of the spine; but, when the truss is removed, it soon becomes of the size of half a small orange. It is therefore necessary, that the use of the truss should be continued. When the truss is removed, the finger can be readily pressed through the tumour into the channel of the spine." (*Medico-Chirurgical Transactions, Vol. 2, p. 323, &c.*)

The next case, also published by Mr. Astley Cooper, will prove, that spinæ bifidæ may sometimes be treated on another plan, so as to accomplish a permanent cure.

"January 21st, 1809, Mrs. Little, of No. 27, Lime-house Causeway, brought to my house her son, aged ten weeks, who was the subject of spina bifida.

"The tumour was situated on the loins; it was soft, elastic, and transparent; and its size about as large as a billiard-ball when cut in half; his legs were perfectly sensible, and his urine and feces were under the power of the will, &c.

"Having endeavoured to push the water, contained in the tumour, into the channel of the spine, and finding that if the whole was returned, the pressure would be too great upon the brain; I thought it a fair opportunity of trying what would be the effect of evacuating the swelling by means of a very fine pointed instrument, and by subsequent pressure to bring it into the state of the spina bifida in Applebee's child.

"I therefore immediately punctured the tumour with a needle, and drew off about two ounces of water.

"On the 25th of January, finding the tumour as large as before it had been punctured, I opened it again, and in the same manner, and discharged about four ounces of fluid. The child cried when the fluid was evacuated, but not whilst it was passing off.

"On January 28th, the tumour was as large as at first, I opened it again, and discharged the fluid. A roller was applied over the tumour, and around the abdomen.

"February 1st, it was again pricked, and two ounces of fluid discharged.

"On the 4th, three ounces of fluid were discharged.

"On February 9th, the same quantity of fluid was evacuated as on the 4th; but, instead of its being perfectly clear, as at first, it was now sanious, and it had been gradually becoming so in the three former operations.

"On the 13th, the same quantity of fluid was taken away; a flannel roller was applied over the tumour and around the abdomen; a piece of pasteboard was placed upon the flannel roller over the tumour, and another roller over the pasteboard to confine it.

"On the 17th, three ounces of fluid, of a more limpid kind, were discharged; the pasteboard was again applied.

"On the 27th, the surface of the tumour inflamed; the fluid, not more than half its former quantity, was mixed with coagulable lymph, and the child, suffering considerable constitutional irritation, was ordered calomel and scammony, and the rollers were discontinued.

"February 26th, the tumour was not more than a quarter of its former size; it felt solid; the integuments were thickened, and it had all the appearance of having undergone the adhesive inflammation.

"On the 28th, it was still more reduced in size, and felt solid.

"On March 4th, it was in the same state as on the 28th of February.

"March 8th, the swelling was very much lessened; the skin over it thickened and wrinkled; a roller was again had recourse to; a card was put over the tumour; and a second roller was applied.

"March 11th, the tumour was much

reduced; the skin covering it was a little ulcerated. On the 15th, it was flat, but still a little ulcerated.

"On the 27th, the effused coagulable lymph was considerably reduced in quantity, and of a very firm consistence.

"On the 2d of May, nothing more, than a loose pendulous bag of skin remained, and the child, appearing to be perfectly well, the bandage was soon left off.

"On December 18th, it was attacked with the small-pox, and went well through the disease.

"The skin now hangs flaccid from the basis of the sacrum; its centre is drawn to the spine, to which it is united, and thus the appearance of a navel is produced in the tumour by retraction of the skin.

"The pricks of the needles are very obvious on each of the punctured parts of the tumour, forming slight indentations." (See *Medico-Chirurgical Transactions, Vol. 2, p.* 326—329.)

At the time when Mr. A. Cooper transmitted this case to the Medico-Chirurgical Society, it had been under his observation two years and a half.

The first of the preceding observations exemplifies the palliative treatment, adopted by the latter gentleman, and consisting of the application of pressure, in the manner of a truss for hernia; the second shews the radical mode of cure by puncturing the swelling from time to time with a needle, and exciting the adhesive inflammation, which, with the assistance of pressure, stops the disease altogether, that is to say, in such examples as admit of cure.

Consult *Ruyschii Observ. Anat. Warner's Cases in Surgery. B. Bell's System of Surgery, vol.* 5. *Abernethy's Surgical and Physiological Essays, Part* 1 *and* 3. *Encyclopédie Méthodique*; *Part. Chir. Art. Spina Bifida. Richter's Anfangsgr. der Wundarzneykunst. A. Cooper in Medico-Chirurgical Transactions, vol.* 2, *p.* 322, *&c.*

SPINA VENTOSA. The Arabian writers first employed this term to express a disease, in which matter formed in the interior of a bone, and afterwards made its way outward beneath the skin. Until the matter had escaped from within the bone, these authors describe, that the pain was incessant and intolerable; but that after the pus had made its way outward by fistulous openings, the pain underwent a considerable diminution. The matter sometimes insinuated itself, from the interior of the bone, into the cavities of the cellular substance, so as to render them soft and flabby, unattended occasionally with any change of colour in the skin. The swelling being partly a serous and partly an inflammatory one, had some of the appearance of emphysema. To express this state, the Arabians added the term *ventosa* to that of *spina*, which was employed, before them, to describe the nature of the pain attendant on the disease. See an account of this subject in the *Encyclopédie Méthodique, Part. Chir. Art. Spina Ventosa.*

The term *spina ventosa* has, since the time of the Arabian writers, been used by many to signify the disease named *white-swelling*, and the former might also mean by it a similar affection, though we should infer the contrary from their account of the matter passing from the interior of the bone to get under the integuments, a thing which I believe never yet happened in any case of white-swelling. Another, and, perhaps, a decisive argument, against the original signification of the word being the same as that of white-swelling, is, that it was not restricted to diseases of the joints and heads of the bones; but was also applied to abscesses, which commenced in the cavities of the middle portions of the long bones, on which parts, I need hardly observe, white-swellings never make their attack.

For these reasons, many respectable authors have implied by the term *spina ventosa*, an abscess in the interior of a bone. See, on this subject, *Latta's System of Surgery, vol.* 1, *p.* 165. Cases of this latter kind, I know, are infinitely rare, compared with that common disorder, in this country, the white-swelling; and, I am also certain, from the descriptions given by some authors, that they have mistaken instances of necrosis for cases of spina ventosa. But, that abscesses do occur, and begin in the interior of the bones, more particularly of those of young persons, I have no doubt myself, both from two or three cases, which I remember having seen in St. Bartholomew's Hospital, and from some cases recorded by the most authentic writers. J. L. Petit relates, that a man, with a tumour on the middle of the tibia, who had been treated by him as a venereal patient, found, a fortnight afterwards, that the pains, which had never ceased, now began to grow more violent. The patient was feverish, his leg became red, and even painful, externally. An incision was made in the situation of the tumour with a view of letting out the matter which was suspected to be the occasion of the bad symptoms, and to have insinuated itself under the periosteum. The incision was of no service, and, two days afterwards, the trepan was applied, by which means, a large quantity of matter was let out. The medullary part of the bone seemed quite annihilated, and the cavity almost empty. Petit made three other perforations with the trepan, and cut away the intervening

pieces of bone. The actual cautery was also used several times to destroy the caries, and the patient at length got well. (*Traité des Maladies des Os, de J. L. Petit.*) If any one doubt, that abscesses now and then form in the middle of the long bones, I must request him to consult Mr. Hey's *Practical Observations in Surgery*, p. 22, where he may peruse two very interesting cases illustrative of what Mr. Hey calls *Abscess in the Tibia with Caries*. One of these I shall take the liberty of quoting.

"Towards the conclusion of the year 1786, a young lady from Richmond, in Yorkshire, consulted me on account of a small tumour in the anterior and middle part of the tibia. It had exactly the appearance of a common node; and had such a degree of softness in its centre, that I apprehend a small quantity of fluid was contained in it; though that could not, from the thickness of the periosteum, be distinctly felt. The account which she gave me of her disorder was as follows:

"In the preceding May she had a fever, which continued about four weeks; at the expiration of which, a violent pain began to affect her leg. The pain continued, without intermission, during six weeks, and then abated upon the appearance of a small tumour on the shin. She could then walk about with little or no uneasiness: but sneezing or coughing caused a painful sensation in the tumour. She was, in other respects, in perfect health.

"I recommended the trial of some means to effect the dispersion of the tumour; and with this view I directed Plummer's pill, with the decoction of mezereon, and applied mercurial ointment to the part, covering the tumour, in the intervals of this application, with ceratum saponis. By the use of these means the tumour became less, and the uneasiness was diminished; so that the young lady thought herself nearly well. But before the expiration of winter, the tumour began again to increase in bulk; and in the summer 1787, she returned to Leeds to put herself entirely under my care.

"The tumour was then larger and softer, and there remained not the least hope of curing my patient without discharging the matter, and afterwards treating the case as the state of the periosteum and tibia might require.

"Upon laying open the tumour, I found the periosteum diseased and thickened; separated from the tibia, and including a small quantity of purulent matter. The surface of the tibia was rough, as far as the matter had covered it; and in the centre of the rough part there was a hole equal in bore to a goose's quill, which penetrated the bone in a direct line about a quarter of an inch.

"As the bone was firm on the rough part, and resisted the pressure of a probe, I thought it right to try whether the surface, upon exposure to the air, would not produce good granulations; and, therefore, after removing so much of the periosteum as I found in a morbid state, I dressed the wound simply.

"Upon continuing this treatment about a fortnight, I became sensible, that more matter issued from the wound than the surface of it ought to have produced. Suspecting, that the hole above mentioned might lead to some cavity in the bone, I plugged it up with lint, and found, on removing the plug the next day, that more purulent matter flowed out than the perpendicular cavity of the bone could contain. I made an examination with a bent probe, and discovered a horizontal cavity connected with the perpendicular one, and running both upwards and downwards in the longitudinal direction of the bone. It was now clear, that the bone was affected with an internal caries; but it was impossible to ascertain the extent of the caries by such an examination.

"Nothing now remained to be done, which could afford a rational hope of curing this disease, except amputation of the limb, or a bold attempt to explore fully the extent of the internal caries, and to remove the diseased part of the bone. I explained the case fully to my patient, who submitted entirely to my judgment the means to be used for her recovery. She had, apparently, a good constitution; and, excepting the caries of the bone, was in perfect health. I determined, therefore, to avoid, if it were possible, disfiguring this young lady by an amputation. I was satisfied, that she would not reproach me on account of my ineffectual endeavours to preserve her limb, if my attempt to remove the diseased part of the bone should prove unsuccessful.

"I began the operation by dissecting off the granulations of flesh, which had arisen from the bone, and then sawed out, by means of a circular headed saw, a wedge of the tibia two inches in length, which I had previously marked at each extremity of the longitudinal cavity in the bone. This wedge was half an inch in breadth, and a quarter of an inch in thickness, and consisted entirely of the laminated part of the bone. The removal of this portion of the tibia brought to view a caries of the cancelli almost as extensive as the length of the piece which I had sawn out. With different trephines, suited to the breadth of the caries, I removed the diseased cancelli of the bone quite through to the opposite

lamella, as this part of the bone was carious throughout its whole thickness.

"As the caries extended itself in various directions, it was not possible to remove the whole of it with a trephine, without removing also a large portion of the sound part of the bone. But this I wished to avoid as much as possible. By the assistance, therefore, of a strong sharp-pointed knife, I pursued the caries in every direction, until I had removed every part which had an unsound appearance.

"This operation took up more than two hours; yet the young lady bore it with the utmost patience and fortitude. I dressed the cavity in the bone, and the rest of the wound, with dry lint, in the most simple manner. The whole surface was speedily filled with good granulations, and a complete cure was obtained without any exfoliation.

"The limb which was diseased, has now as much strength as the other; and no uneasiness is produced even by violent exercise." (*Practical Observations in Surgery, p.* 22, *&c.*)

In the *First Lines of the Practice of Surgery* I described, under the name of *spina ventosa*, a disease in which matter formed in the interior of a bone, attended with expansion of the part affected. In giving this meaning to the word spina ventosa, the reader is already aware, that I have only imitated many of my predecessors, and that, perhaps, the original import of the term would vindicate me in so doing. Mr. Crowther, in his book on the white-swelling, observes, "it is singular, that Mr. Cooper should allow to the spina ventosa that expansion which he has denied to the white-swelling. Did this gentleman (he continues) not know, that the spina ventosa of the joints has been considered as a scrophulous caries of the ends of the bones?" To this passage, my preceding statement answers every purpose of a reply, and I am only left a little surprised, that this gentleman should have been disposed to make an attack on me, without first ascertaining, by a careful perusal of proper works, whether I had any authority for my remarks. With regard to the swelling of the bone, in the spina ventosa, or case of abscess in the interior of the part, I cannot decide from my own observation, if it be a fact or not; and, as Mr. Crowther had no idea that the term spina ventosa was ever used to signify the kind of disease already described, I conclude, that he is equally uninformed concerning the other point. As a systematic writer, I was, of course, obliged to take from other authors some descriptions which were, of necessity, not founded on my own observation. But, without pretending to decide the question myself, I may safely say, that the account, given by authors, of the bone becoming swollen, when affected with abscess within it, has nothing to do with what is the case in white-swellings, and that, because the heads of the bones are not expanded in the latter disease, we are not to infer, that bones may not sometimes swell in a totally different disorder.

For an account of spina ventosa, in the sense of white-swelling, refer to *Joints*.

SPIRITUS AMMONIÆ COMPOSITUS. Besides the well known uses of this medicine, internally exhibited, its vapours are an exceedingly proper application to the eye in some cases of chronic ophthalmy. Scarpa recommends a remedy of a similar nature.

SPLINTS. Long pieces of wood, tin, or strong pasteboard, employed for preventing the ends of broken bones from moving so as to interrupt the process by which fractures unite. These instruments are sometimes used in other cases, for the purpose of keeping limbs from moving, particularly in some kinds of dislocations, wounds, &c. For an account of the principles on which splints ought to be employed, see the article *Fractures*.

SPONGIA PRÆPARATA. (*Prepared Sponge; Sponge-tent.*) This is formed by dipping pieces of sponge in hot melted emplastrum ceræ compositum, and pressing them between two iron plates. As soon as cold, the substance thus formed, may be cut into pieces of any shape. It was formerly much used for dilating small openings, for which it was well adapted, as when the wax melted, the elasticity of the sponge made it expand and distend the opening, in which it had been put. The best modern surgeons seldom employ it.

SPONGIA USTA. (*Burnt Sponge.*)—This is often given in the form of lozenges, in cases of bronchocele, in which particular instances much efficacy is imputed to allowing the lozenges to dissolve gradually in the mouth, after putting them under the tongue. Burnt sponge is also exhibited in many scrofulous diseases. Its good effects are supposed to depend on the quantity of soda which it contains. The dose is from a scruple to a dram.

STAPHYLOMA. (from σταφυλη, a grape.) A disease of the eye, so named from its being thought to resemble a grape. Staphyloma is that disease of the eyeball, in which the cornea loses its natural transparency, rises above the level of the eye, and successively even projects beyond the eyelids, in the form of an elongated, whitish, or pearl-coloured tumour, which is sometimes smooth, sometimes uneven, and is attended with total loss of sight.

Scarpa observes, that infants are often

attacked by this disease soon after their birth, and mostly in consequence of the purulent ophthalmy. It is also produced by the small-pox, yet never during its eruption, which is singular; nor during the stage of suppuration; but, when the pustules dry, and even after the detachment of the variolous scabs.

In a great number of subjects, says Scarpa, when the staphyloma has attained a certain elevation above the cornea, it becomes stationary, or only increases in due proportion to the rest of the eye. In other instances, the small tumour of the cornea successively enlarges in all its dimensions, and in such a disproportion to the rest of the eye, that it at length protrudes considerably between the eyelids, to the great molestation and deformity of the patient.

Scarpa notices, that this disease is justly considered as one of the most serious, to which the eyeball is subject; for, to the total and irremediable loss of sight that it occasions, are added all the evils which necessarily result from the bulk and protuberance of the staphyloma, after the swelling of the cornea has acquired such a size, that it can no longer be covered by the eyelids. In such circumstances, the continual exposure of the eyeball to the contact of the air, and particles of matter suspended in it; the friction of the eyelashes against it; the incessant flux of tears down the subjacent cheek; are enough to render the eye painful and inflamed; the sound one is affected by sympathy, and the diseased one at length ulcerates, together with the lower eyelid and cheek, on which it presses.

Scarpa next remarks, that surgeons have long thought, that, in this disease, the cornea yields to the distention produced by the turgescence of the humours of the eye, nearly in the same manner as the peritoneum yields to the pressure of the abdominal viscera, when an intestinal hernia takes place. Richter (*Obs. Chir. Fasc.* 2.) has opposed this theory, observing, that the staphyloma, for the most part, forms, without the swelling of the cornea having been preceded by any of those morbific dispositions, which are generally considered capable of weakening the texture and elasticity of the cornea; that this membrane, when affected with staphyloma, acquires a much greater thickness than what it has in its natural state, and, consequently, that the staphyloma, far from being concave within, is every where compact and solid; though it ought to be quite the contrary, if the tumour had been occasioned by an immoderate distention, operating on the cornea from within outward, with an attenuation of its natural texture.

In regard to this circumstance, says Scarpa, though I would wish to give Richter all the praise, to which he is entitled for his conspicuous merit in every branch of the healing art, I cannot refrain from noticing, that this celebrated author, in pointing out a matter of fact, as he has done, respecting the origin and nature of the staphyloma, has generalized his doctrine too much, by not drawing any line of distinction between the staphyloma of recent occurrence in infants, and that of adult subjects, in whom the disease has acquired so large a volume, as to protrude considerably beyond the eyelids. I fully agree with Richter, (for it is a certain and demonstrable fact,) that the recent staphyloma in infants is quite compact and solid, on account of the augmented thickness of the cornea in this disease; but it is equally certain, as I have been convinced by repeated observation, that, in this very same staphyloma, originally quite solid and compact, the cornea, strictly speaking, becomes thinner, or, at all events, is not thicker, than in its natural state, after the disease has existed a series of years in adult subjects, and in whom the swelling of the cornea has attained such a size, as to protrude between the eyelids. I wish to imply, that the tumour is not solid throughout, except in regard to its containing, in its amplified state, the iris, the crystalline, and very often, also, a portion of the vitreous humour. These parts, having quitted their natural position, are propelled forward, so as to fill the cavity, which gradually forms in the cornea, and grows larger.

As Scarpa continues, the cornea of infants, in its natural state, is, at least, twice as thick and pulpy as that of adults, and, consequently, the anterior chamber of the aqueous humour, in the former, is comparatively so contracted, to what it is in the latter, that, in infants at the breast, the cornea may be considered as in contact with the iris. In the latter subjects, the softness, flexibility, and succulency of the cornea are naturally such, that, when this membrane is separated from the rest of the eye in the dead subject, and compressed between the fingers, it loses, at least, one half of its volume, and thickness, which does not happen in adults. The cornea of young children is so supple, and distensible, that, in minute injections of the head, when the injected matter is copiously extravasated in the eye-ball, the cornea distended from behind forward, elevates itself in the dead subject considerably towards the eyelids; a thing, says Scarpa, that is not observable, under similar circumstances, in the eyes of adults.

To such qualities of the cornea, in

children of tender years, and to the natural narrowness of the anterior chamber of the aqueous humour, Scarpa imputes the cause, why ophthalmies in infants so often produce opacity and thickening of this membrane. The cornea swells, becomes preternaturally thickened, and is very soon converted into a pointed, whitish, or pearl coloured tumour, without any cavity internally, and either in perfect contact with, or adherent to, the iris. In the course of years, however, Scarpa remarks, that this disease undergoes new modifications. For, as the whole eye enlarges with age, the iris, and crystalline, from causes not sufficiently understood, abandon their natural situation, and are incessantly urged forward. This effect is increased, by the very limpid and copious state of the vitreous humour, always existing, when the disease under consideration is inveterate. In this circumstance, whenever the cornea is not completely indurated, and inflexible, the crystalline and iris are insensibly propelled, from within outward, nearer and nearer to the cornea, which they in time distend in all its dimensions, so as to make it project beyond the eyelids, at the same time attenuating it, in a ratio to the bulk, and magnitude, which it assumes. Scarpa has never met with a voluminous staphyloma, projecting beyond the eyelids in adult persons, which had not originally made its first appearance in infancy; and he has invariably found, that the thickness, and density of the cornea, both in the living, and dead bodies of those, who have been affected with this disease, were in an inverse ratio to the eye. In inveterate cases of staphyloma, forming a large protuberance beyond the eyelids, the iris may here and there be clearly discerned through the diseased cornea, and, if it be not equally manifest at all points of the tumour, it is because the conjunctiva externally spread over the cornea forms, in conjunction with its various vessels, on the surface of the tumour, a stratum of matter, not every where equally dense, and opaque. This dense stratum of the conjunctiva, spread over the cornea, easily causes deception, in the staphyloma that has attained a considerable bulk. The more the tumour increases, the more the substance of the cornea seems to become dense and thickened; while, in reality, the contrary happens; for the augmentation in the density of the layer of the conjunctiva, covering the cornea, only partly supplies the diminution in the thickness of the texture of this last membrane. Scarpa thinks it very improbable, that the accurate observers of all ages would have neglected to notice, that the cornea, in this advanced stage of the disease, instead of being attenuated, according to the common opinion, is even quite a compact and solid body. Scarpa says, the contrary is recorded in their works, where they speak of the extirpation of thick staphylomas by means of a ligature, and they caution us to tie the thread very gently, lest the cornea, which, in these cases, is very thin, should easily be torn. Gunz relates, that he was an eye-witness of such an accident, which happened to a patient, in whom a staphyloma had been tied by means of a needle, and thread. (*De Staphylom. Dissect. vid. Disput. Chir. Halleri.*)

Scarpa allows, that Richter's doctrine is then a matter of fact, as it relates to the recent staphyloma of infants; but, as far as his own experience goes, it admits of exceptions, in regard to the thickness of the cornea, in the staphyloma of old date, considerable bulk, protruding beyond the eyelids.

Some pretend, says Scarpa, that the sclerotica is also subject to staphyloma, that is, to a partial distention, and prominence of its anterior hemisphere in the white of the eye. Others question the existence of such a disease. Scarpa acknowledges, indeed, that he has never yet met with any tumour, or prominence on the front surface of the sclerotica, corresponding to the white of the eye. On the contrary, what will seem extraordinary and singular, this celebrated surgeon has twice seen, in the dead subject, a staphyloma, in the posterior hemisphere of the sclerotica, a situation, in which it has neither been seen, nor described, by any one, as far as Scarpa knows. The first instance was in an eye, removed for quite another motive, from the body of a woman, forty years of age. This eye was of an oval shape, and altogether larger than the other, which was healthy. On its posterior hemisphere, on the outside of the optic nerve, or the part nearest the temple of the same side, the sclerotica was elevated, in the form of an oblong tumour, resembling a small nut. As the cornea was healthy and pellucid, and the humours still retained their natural transparency, on looking into the pupil of the eye in question, an unusual brilliancy could be seen at the bottom, formed there by the light passing through that part of the cornea, affected with staphyloma, which had become attenuated, and diaphanous. On opening this eye, Scarpa found the whole of the vitreous humour deranged in its organization, and converted into a limpid, aqueous fluid, and the crystalline somewhat yellowish, but not opaque. The posterior hemisphere of the eye being immersed in spirit of wine, to which a few drops of nitrous acid had been added, in order to give to the retina

consistence, and opacity, Scarpa could distinctly discern, that the cavity of the staphyloma, in the sclerotica, was not invested with the nervous expansion of the retina; that the choroides, in this place, was very subtile, discoloured, and destitute of its usual reticulated vascularity; and that, in particular, the sclerotica was so attenuated, in the situation of the staphyloma, that it was hardly as thick as a sheet of writing-paper. Scarpa learnt, that the woman, from whose body this eye was taken, had some years previously lost the power of seeing with this organ, during the prevalence of an obstinate ophthalmy, attended with habitual and excruciating head-achs.

Scarpa had an opportunity of observing a similar disease of an eye, accidentally taken from the body of a woman, thirty-five years of age. It was sent to him from Milan, by Doctor Monteggia. It was of an oval shape, and larger, than its fellow. The staphyloma of the sclerotica was situated on its posterior hemisphere, on the outside of the entrance of the optic nerve, in other words, towards the temple. The vitreous humour was converted into water, the capsule of the crystalline was very turgid, with a limpid, whitish fluid; the lens was yellowish, and smaller, than natural; in the interior of the staphyloma of the sclerotica, the retina was wanting; the sclerotica itself, and the choroides were elevated in the form of a tumour, and attenuated in such a manner, that the light passed through them. Scarpa could not learn any thing concerning the state of this woman's sight; but, in regard to the disease he much doubts, whether art will ever succeed in administering efficacious means for the stoppage of its progress, much less for its cure.

But, to return to the staphyloma of the transparent cornea, this part of the eye-ball being, in this circumstance, affected with an irremediable opacity. Scarpa remarks, that the surgeon can have no other aim in the treatment of this disease, when it is recent in children of ten years, but to hinder the increase of the swelling of the cornea, the organization of which membrane is already destroyed. The tumour must be levelled, and flattened as much as possible; and when the swelling of the cornea is inveterate, very large, and prominent beyond the eyelids, it is to be diminished by surgical means, so as to return within the orbit, sufficiently to permit the deformity of the face to be amended by the application of an artificial eye.

Richter proposes, in cases of recent staphyloma, to make at the bottom of the tumour of the cornea an artificial ulcer, by repeatedly applying the argentum nitratum, or the oxygenated muriate of antimony (butter of antimony), and to keep it open by the continued use of the same caustic, with a view of affecting by means of this little issue, the dispersion of the gross tenacious humour, which is the immediate cause of the preternatural opacity, and swelling of the cornea. The author assures us, says Scarpa, that, in this way, he has many times effected a diminution of the staphyloma, and, in one particular case, even restored the transparency of the cornea. This cure has always seemed to Scarpa the most rare, and surprising, of all, that are recorded on the subject of diseases of the eyes; the more so, as this success was obtained in the space of fourteen days. *Ter repetitâ operatione, quarto scilicet, septimo et decimo die, ne vestigium quidem morbi die decimo-quarto supererat. Obs. Chir. Fasciculus* 2.

Scarpa declares, that though he has frequently attempted to cure the recent staphyloma, in infants, by the above method of making an issue, and this with the greatest confidence of success, and in the persuasion, that this plan of cure was founded on certain, and obvious premises, respecting the nature of the disease, when it is recent, and in children of tender years; though, in doing so, he had for imitation a master in surgery of the highest authority; he has never yet met with such success, as can be at all compared with Richter's either in restoring the transparency of the cornea, or accomplishing a diminution of the volume of the staphyloma. Having formed with the argentum nitratum a small ulcer, at the bottom of the cornea, and kept the sore open thirty days and more, he failed in obtaining any benefit, in respect to the diminution, much less the opacity of the cornea, in three infants, one a year and a half old, and the two others somewhat more than three, all which subjects had been recently attacked with staphyloma in one eye, in consequence of the small-pox. A violent chemosis, in a very short time, produced a staphyloma in the eye of a child, five years old. Scarpa made an ulcer at the bottom of the cornea, in the unorganized, swollen substance of which he introduced, for a little depth, the flat part of a lancet. Scarpa kept the sore open, for five weeks, with a solution of the argentum nitratum, and he remarked, that the staphyloma became somewhat flatter, so as to lose the acute prominence, which it had at its centre; but the cornea continued as before, every where opaque. Though Scarpa employed the same method in two other subjects, of about the same age, and in the same circumstances; though he kept the ulcer open fifty days, he was never able to effect any depression or diminution of the staphyloma; and, consequently, the pointed, pearl-coloured, projecting part of the tumour continued

in the same state as it was before. Scarpa states, that the conical shape, which the cornea assumes in this disease, is a characteristic symptom, by which a staphyloma may be distinguished from the leucoma, with total opacity of the cornea.

If, also, in the course of further trials, partial benefit be found to accrue from this plan, adopted not for the purpose of re-establishing the transparency of the cornea, but for that of merely checking, and diminishing the recent staphyloma in infants, still Scarpa is of opinion, that no one will be easily persuaded, that the same treatment can ever prove of the least service, in diminishing the size of the large, inveterate, staphyloma in adults; in other words, of that, which projects beyond the eyelids, and rests on the cheek. What advantage can be expected from an artificial ulcer, formed in the substance of the cornea, no longer soft and pulpy, nor merely thickened by a viscid matter, effused in the interstices of its texture, but become dry and coriaceous from time, protruding in consequence of the excessive distention from within outward, and covered with a callous crust, consisting of the layer of the conjunctiva, and its varicous vessels? Certain it is, says Scarpa, that as often as it has happened, that the inveterate staphyloma, protruding out of the eyelids has accidentally ulcerated from the irritation of any extraneous body, the tears, or long pressure of the parts, on which it rests, the ulcer has never been seen to effect a diminution of the disease; we even read, that the ancient staphyloma, under such circumstances, has often degenerated into a malignant fungus.

Hence, Scarpa observes, that in the highest stage of this disease, when the staphyloma projects beyond the eyelids, art has, at present, no more effectual means for restraining the progress of the complaint, and removing the deformity, than cutting away the staphyloma, and when the place is healed, applying an artificial eye.

Celsus thus expresses himself on the subject of this operation: *Curatio duplex est. Altera ad ipsas radices per medium transuere ocu, duo lina ducente, deinde alterius lini duo capita ex superiore parte, alterius ex inferiore adstringere inter se quæ paulatim secando id excidant. Altera in summâ parte ejus ad lenticulæ magnitudinem excindere; deinde spodium, aut cadmiam infricare. Utrolibet autem facto, album ovi lana excipiendum, et imponendum; postæque vapore aquæ calidæ fovendus oculus, et lenibus medicamentis ungendus est.* De Medicina, lib. 7. cap. 7.

Though, says Scarpa, the first plan or that of the ligature, is at present abandoned, as being generally thought the least appropriate; the majority of surgeons still persevere in passing a needle and ligature, through the lower part of the staphyloma, not for the purpose of tying, or constricting the tumour, it is true, but of making a noose, in order to fix the eye conveniently, when the staphyloma is to be cut off in a circular manner. But Scarpa proves, that the same advantage may be obtained by a very simple method, which is more expeditious, and less incommodious to the patient, and, he is therefore, persuaded, that the apparatus of the needle and ligature will very soon be disused, both as a means of cure, and an auxiliary in the operation.

With regard to the second method of removing the staphyloma, or that of excision, Scarpa thinks, that sufficient attention has not hitherto been paid to what Celsus has written on this subject. In fact, Celsus does not forbid cutting away the staphyloma, by a circular incision at its base, as is practised at the present day, but says, that this operation is to be done in the centre, or conical point of the tumour, and that as much of this part of the staphyloma is to be cut away, as will equal a lentil in size: *In summâ parte ejus ad lenticulæ magnitudinem excindere.* Scarpa remarks, that the great importance of this precept of Celsus in regard to the successful treatment of the staphyloma, can only be duly appreciated by such as have often had occasion to compare the advantages of Celsus's doctrine, with the serious inconveniences, which result from the common practice of cutting away the staphyloma circularly at its base; and with the evils produced by a semicircular section, comprehending the sclerotica, in Woolhouse's manner, always followed by acute inflammation of the eyeball and eyelids, violent pains in the head, restlessness, spasms, copious and sometimes gangrenous suppurations of the eye and eyelids. To Scarpa it is a matter of fact, proved by a numerous series of observations, that, the more the semicircular recision of the staphyloma is distant from the centre or apex of the tumour, approximating its base, and advancing towards the sclerotica, the more aggravated are the symptoms consequent to this operation; *& vice versâ.*

The following is Scarpa's method of effecting the destruction of the inveterate staphyloma, protruding out of the eyelids. The patient being seated, Scarpa directs an assistant to support his head properly; then taking in his hand a knife, similar to what is used in the extraction of the cataract, he passes the instrument completely across the staphyloma, at the distance of one line and a half, or two lines, from the centre or apex of the tumour,

from the external towards the internal angle of the eye, and, by passing the knife forward in the same direction, just as is done in the extraction of the cataract, he makes a semicircular incision downwards, in the most prominent part of the tumour. Having done this, he takes hold of the segment of the staphyloma with the forceps, and turning the edge of the knife upward, he completes the circular recision of the apex of the tumour, in such a way, that the detached portion is one, two, three, or four lines in diameter, according to the size of the staphyloma. As a portion of the iris, adhering to the cornea, from the very commencement of the disease, is commonly included in this section of the pointed part of the tumour, no sooner is the circular division of the apex of the staphyloma made, than the crystalline, or its nucleus, issues from the eye, followed by a portion of the dissolved vitreous humour. In consequence of this evacuation, continues Scarpa, the eye-ball often diminishes in such a degree, that it can be covered by the eyelids, to which Scarpa immediately applies a pledget of dry lint, supported by a retentive bandage.

The pain, produced by this section, is of the smallest consequence, and it is common to see patients perfectly tranquil, the three, or four first days after the operation. The eye and eyelids most frequently begin to be painful, inflame, and swell, on the fourth day. On the appearance of these symptoms, which ordinarily are very mild, the eye, on which the operation has been done, is to be covered with a bread and milk poultice, in order to promote and accelerate the suppuration of the internal membranes of the eye. When things proceed in a regular manner, the tumefaction of the eyelids subsides about the seventh, or ninth day, and purulent matter is seen on the poultice, blended with the dissolved vitreous humour, which slowly issues from the bottom of the eye. The matter afterwards becomes thick, and whitish, with relief to the patient, and manifest diminution of the whole eye-ball, which not only shrinks within the eyelids, but even sinks into the orbit.

At this period, observes Scarpa, on gently separating the eyelids, the conjunctiva is found swollen, and reddish, and the margin of the wound of the staphyloma seems like a whitish circle. When the detachment of this gelatinous circle takes place, which usually is on the twelfth or fourteenth day after the operation, the edge of the surface, from which the staphyloma was cut, becomes red, contracts, and daily diminishes, so that, at last, the wound is entirely closed. There only remains in the centre of the cornea, for a few days, a small fleshy prominence resembling a little reddish papilla, which, after being touched a few times with the argentum nitratum, contracts, and becomes completely healed.

So far, says Scarpa, are alarming symptoms from following this operation, that in a great number of cases, the surgeon is even obliged, several days afterwards, to stimulate the eye, on which it has been performed, in order to make it inflame, partly by leaving it a long while uncovered, and exposed to the air, partly by enlarging the circular recision made in the centre of the staphyloma, of which another circular portion, half a line broad, is removed, in order to facilitate the more abundant discharge of the humours, and the ingress of air into the cavities of the eye, which are so backward to inflame. As soon as inflammation has invaded the interiour of the eye, and suppuration has taken place, the rest of the cure regularly follows under the use of topical emollients, and is soon completed with all possible mildness. As by putting into execution the above method of destroying the staphyloma, the consequent shrinking of the eye-ball takes place equally around the great axis of this organ, the stump, which follows, has also a regular circumference, and presents an easy, and commodious place for the application of an artificial eye. (*Scarpa sulle Malattie degli Occhi.*)

Wenzel and numerous other writers, imply by staphyloma, a protrusion of a piece of the iris, through a wound or ulcer of the eye. See *Iris, Prolapsus of.*

STEATOMA. (from στιαρ, fat.) A wen, or encysted tumour, containing fat. See *Tumours, Encysted.*

STELLA, or STELLATED BANDAGE. A bandage so named because it makes a cross, or star on the back. It is a roller, applied in the manner of the figure 8, so as to keep back the shoulders. It is often employed in cases of fractures, and dislocations of the clavicle.

STERNUTATORIES. (from *sternuto*, to sneeze.) *Sternutatoria.* Medicines, which provoke sneezing. In surgery, they are sometimes recommended in cases of gutta serena. See *Amaurosis.*

STERTOR. (from *sterto*, to snore.) A snoring noise, or rattling, in the throat; a symptom of several surgical, as well as medical affections.

STRABISMUS. (from στραβιζω, to squint.) Squinting.

STRANGURY. (from στραγξ, a drop, and ουρον, the urine.) *Stranguria.* A difficulty of voiding the urine, which comes away by drops, and with pain.

STRICTURE. (from *stringo*, to bind.) A diminution, or contracted state of some tube, or duct in the body. See *Urethra, Strictures of*; *Œsophagus, &c. Rectum, &c.* Stricture also means, in cases of stran-

gulated hernia, the narrowest part of the opening, or passage, through which the bowels protrude, which narrowest part makes on the viscera the pressure causing all the bad symptoms. See *Hernia*.

STRUMA. (from *struo*, to heap up.) Scrofula, or Scrophula. The King's Evil. See *Scrophula*.

STYE. A little inflammatory tumour on the eyelid. See *Hordeolum*.

STYPTICS. (from στυφω, to bind.) *Styptica*. Medicines and applications for stopping hemorrhage. See *Hemorrhage*.

SUBSULTUS. (from *subsilio*, to leap a little.) An involuntary spasmodic twitching of the muscles and tendons.

SUDORIFICS. (from *sudor*, sweat, and *facio*, to make.) Medicines which produce perspiration.

SUFFUSION. (*Suffusio*, from *suffundo*, to pour down.) The cataract was so named by Celsus, from an idea, that the opacity arose from the pouring down of a thick humour from the crystalline lens.

SUGILLATIO. (from *sugillo*, to make black and blue with beating.) The discolouration, following a bruise, and caused by an extravasation of blood; an ecchymosis.

SUPPOSITORY. (from *suppono*, to lay under.) *Suppositorium*. A globular, medicated substance, intended to be introduced into the rectum.

SUPPRESSION OF URINE. See *Urine, Retention of*.

SUPPURATION. (*Suppuratio*, from *suppuro*, to suppurate.) This signifies a process, by which a peculiar fluid, termed *pus*, is formed in the substance, or from the surface, of parts of the body, when such parts are particularly circumstanced.

The article *inflammation* made us understand, that phlegmonous inflammation, when it exceeds a certain pitch, sometimes terminates in suppuration, and, consequently, it follows, that parts, in a certain state of inflammation, are in one of those circumstances, which qualify them for the production of pus.

SYMPTOMS OF SUPPURATION.

When matter is fully formed in a tumour, there is a remission of all the symptoms. The throbbing pain, which was before frequent, now goes off, and the patient complains of a more dull, constant, heavy pain. A conical eminence, or *pointing*, as it is termed, takes place at some particular part of the tumour, generally near its middle. In this situation, a whitish, or yellowish appearance is generally observable, instead of a deep red, which was previously apparent, and a fluctuation of a fluid underneath may be discovered, on a careful examination with the fingers. Sometimes, indeed, when an abscess is thickly covered with muscles and other parts, the fluctuation cannot be easily distinguished, though, from other concurring circumstances, there can hardly be the least doubt of there being even a very considerable collection of matter. An œdematous swelling over the situation of deeply situated abscesses is a symptom, which often occurs, and is well worthy the attention of every practical surgeon.

The discovery of the existence of deep abscesses is a circumstance of the highest importance in practice, and one which greatly involves the practitioner's reputation. In no part of the surgeon's employment is experience, in former similar cases, of greater use to him, than in the present; and however simple it may appear, yet nothing, it is certain, more readily distinguishes a man of observation and extensive practice, than his being able easily to detect collections of deep-seated matter. On the contrary, nothing so materially injures the character and professional credit of a surgeon, as his having in such cases, given an inaccurate or unjust prognosis; for, in disorders of this kind, the nature and event of the case are generally at last clearly demonstrated to all concerned.

Together with the several local symptoms of the presence of pus, already enumerated, may be mentioned the frequent shiverings, to which patients are liable on its first formation. However, these rigors seldom occur so as to be distinctly observed, unless the collection of matter is considerable, or situated internally in some of the viscera.

The pain, attending what Mr. Hunter termed the suppurative inflammation, is increased at the time when the arteries are dilated, and this gives the sensation called throbbing, in which every one can count his own pulse, by merely paying attention to the inflamed part. Perhaps, this last symptom is one of the best characteristics of this species of inflammation. When the inflammation is moving from the adhesive state to the suppurative, the pain is considerably increased; but, when suppuration has taken place, the pain in some degree subsides. (*Hunter.*)

The redness that took place in the adhesive stage, is now increased, and is of a pale scarlet colour. The part, which was firm, hard, and swelled, in the previous stage of the inflammation, now becomes still more swelled, in consequence of the greater dilatation of the vessels, and the greater quantity of coagulating lymph thrown out. (*Hunter.*)

THEORY OF SUPPURATION.

The dissolution of the living solids of an animal body into pus, and the power of this fluid to continue the dissolution,

are old opinions, which, however, are still entertained by many, for their language is, *pus corrodes, it is acrid, &c.* If these notions were true, no sore, which discharges matter, could be exempted from a continual dissolution. Such ideas probably arose from the circumstance of an abscess being a hollow cavity in the solids, and from the supposition, that the whole of the original substance of this cavity was now the matter, which was found in it. This was a very natural way of accounting for the formation of pus by one entirely ignorant of the moving juices, the powers of the arteries, and what takes place in an abscess after it is opened. The knowledge of these three subjects, abstracted from the knowledge of the abscess before its being opened, should have led surgeons to account for the formation of pus from the blood by the powers of the arteries alone. According to the above erroneous principle, abscesses would continue to increase after being opened, as fast as before. Upon the principle of the solids being dissolved into pus, the practice of bringing all indurated parts to suppuration, if possible, and not making an early opening, was founded. This was done for the purpose of giving time for the solids to melt down into pus; but, it was apparently forgotten, that abscesses formed matter after they were opened, and, therefore, the parts stood the same chance of dissolution into pus as before. Blinded with the idea, that the solids entered into the composition of pus, the partisans of this doctrine could never see pus flowing from any internal canal, as from the urethra, in cases of gonorrhœa, without supposing the existence, of an ulcer in the passage. Such sentiments might be forgiven, before it was known, that such surfaces could, and generally did, form pus, without a breach of the solids; but, the continuance of this way of thinking now is not mere ignorance, but stupidity. The formation of pints of matter in the cavities of the chest, and abdomen, without any breach in the solids, could not have been overlooked by the most zealous advocates for the doctrine of dissolution. (*Hunter.*)

The moderns have been still more ridiculous; for, knowing, that it was denied, that the solids were ever dissolved into pus, and that there was not a single proof of it, they have been busy in producing what to them seemed a proof. They have been putting dead animal matter into abscesses, and, finding, that it was either wholly, or in part dissolved, they, therefore attributed the loss to its being formed into pus. This, however, was putting living and dead animal matter upon the same footing, which is a contradiction in itself; for, if the result of this experiment were really what they supposed it to be, the idea of living parts being dissolved into pus must be abandoned, because living and dead animal matter can never be considered in the same light. (*Hunter.*)

It might have been remarked, that even extraneous animal matter would lie in abscesses for a considerable time, without being dissolved, and, that in abscesses arising, either from violence, or from a species of erysipelatous inflammation, there were often sloughs of the cellular membrane, which sloughs would come away, like wet tow, and, therefore, were not dissolved into pus. (*Hunter.*)

It might also have been noticed, that in abscesses in tendinous parts, as about the ankle, a tendon often mortified, and sloughed away, and that the sores would not heal till such sloughs were detached; but though this separation was sometimes not completed, before the expiration of months, yet the sloughs at last were thrown off, and consequently could not be converted into pus. Pieces of dead bone often lie soaking in matter for many months, and yet without being changed into pus; and although bones, so circumstanced, may lose a considerable deal of their substance, a loss which some might impute to the dissolution of the bone into pus, yet, that waste can be accounted for and proved on the principle of absorption. The loss is always upon that surface, upon which the continuity is broken off, and it is a part of the process by which the exfoliation of a dead piece of bone is accomplished. The formation of pus has been attributed to a kind of fermentation, in which both the solids and fluids were concerned. This doctrine is easily refuted by stating what happens in internal canals, which naturally secrete mucus, but frequently form pus, without any loss of substance, or any previous fermenting process. Were we to suppose a fermentation of the solids and fluids the immediate cause of the production of pus, whence could the solids come, which enter into the composition of discharges from the urethra? for the whole penis could not afford matter enough to form the pus, which is discharged in a common gonorrhœa. How also should the fermentation of the solids ever cease? for, there is the same surface secreting its mucus, whenever the formation of pus is discontinued. It may be asked, likewise, by what power the first particle of pus in an abscess, or on a sore, is formed, before there is any particle existing, which is capable of dissolving the solids? An abscess may be stationary for months, and at last be absorbed; what becomes of the fermentation all the while the collection of matter continues stationary?

Extravasated blood has been supposed to be capable of being converted into pus. We find, however, that blood, when extravasated, either from violence, or a rupture of a vessel, as in an aneurism, never of itself becomes pus; nor was pus ever formed in these cases, without being preceded by inflammations. Both the blood and matter are also found together in the same cavity, under such circumstances. If the blood had coagulated, which it seldom does in cases of violence, it would be found still coagulated; and if it had not coagulated, the pus would be bloody.—(*Hunter.*)

The modern theory of suppuration is, that the matter is separated from the blood by the secretory power of the vessels of the inflamed part, which now acquire a new mode of action.

The opinion, that suppuration is a process, analogous to glandular secretion, has been hastily rejected by many, who are swayed by the fact, that there is no pus ever found blended with the blood in the circulating system. By this mode of reasoning, however, such thinkers must be led to deny the universally received and undoubted doctrine, that the bile is a secretion; and, yet, it is well known, that nothing like this fluid can be detected in an analysis of the blood, and, indeed, a very small quantity would be sufficient to tinge the whole mass of circulating blood with a yellow colour, the same as we see in cases of jaundice. No one would wish to defend the idea of there being either pus, or bile, actually in the circulation; but, only the matter, or modifications of the matter, which, by the combinations, or whatever changes, we may choose to term them, taking place in the secreting vessels, and by their operations are converted into one of the particular fluids in question.

No suppuration ever takes places without being preceded by inflammation; no pus is ever formed but in consequence of it. In abscesses, a suppuration is an immediate effect of inflammation; and when internal cavities remain exposed, no suppuration comes on, till inflammation has formed the disposition and action.

Violence done to parts is one of the great causes of suppuration; but, simply, violence does not always occasion it. The violence must be followed by a prevention of a cure in a more simple way, viz. by a restoration of the structure, so as to carry on the animal functions of the part. The parts must be kept long enough in that state, into which they were put by the violence. Or, what is somewhat similar to this, the violence must be attended with death in a part, as, in many bruises, all mortifications and all sloughs, in consequence of the application of caustic, which, when the dead parts separate, leave internal surfaces exposed. (*Hunter.*)

As every violence, committed from without, under the above circumstances, is more or less exposed to the surrounding air, its application to internal surfaces has been assigned as a cause of suppuration; but, certainly, the air has not the least effect on parts, circumstanced as above, for a stimulus would arise from a wound, were it even contained in a vacuum. In circumscribed abscesses, the air cannot possibly get to the parts, so as to have any share in making them suppurate.

In cases of emphysema, when the air is diffused over the whole body, no suppuration is the consequence, unless an exposure, or imperfection of some internal surface should be made, for the purpose of allowing the air to escape. A stronger proof, that it is not the admission of air, which makes parts inflame, is, that the cells in the soft parts of birds, and many of the cells and canals of their bones, communicating with the lungs, and always containing air, never inflame; but if these cells are exposed in an unnatural way, then the stimulus of imperfection is given, these cavities then inflame, and their surfaces either form adhesions together, or produce pus. (*Hunter.*)

QUALITIES OF PUS.

True pus has certain properties, which when taken singly, may belong to other secretions, but, which, conjointly, form the peculiar character of this fluid, viz. globules swimming in a fluid, which is coagulable by a solution of sal ammoniac, which no other animal secretion is, and, at the same time, a consequence of inflammation.

The colour and the consistence of pus are the two qualities which first attract the notice of every, the most superficial observer. The colour arises from the largest portion of this fluid being composed of very small round bodies, very much like those little globules, which, swimming in a fluid, make cream. The fluid, in which the globules of pus swim, we might at first suppose to be the serum of the blood, for it coagulates with heat, like the latter fluid. Pus is also probably mixed with a small quantity of coagulating lymph; as it partly coagulates, after it is secreted.

The fluid part of pus, however, is known to have properties, which serum has not. There being a similarity between pus and milk, experiments have been made to ascertain whether the fluid

of pus could be coagulated with the gastric juice of animals; but, no coagulation could be effected in this manner; a solution of sal ammoniac made the fluid part of pus coagulate; but, not any other secretion, or natural fluid; and, hence, it was concluded, that whenever globules were found swimming in a fluid, coagulable by sal ammoniac, the matter was to be considered as pus. (*Hunter.*)

The proportion, which the white globules bear to the other parts of pus, depends on the health of the parts producing the discharge. When the globules are very abundant, the matter is thicker and whiter, and is called healthy pus; the meaning of which is, that the solids, which produced it, are in good health; for, these appearances in the matter are no more, than the result of certain salutary processes going on in the solids, the effect of which processes is to produce the disposition, on which both suppuration and granulation depend. (*Hunter.*)

Pus is specifically heavier than water, and is probably about as heavy as blood.

Besides the above properties, pus has a sweetish mawkish taste, very different from that of most other secretions, and the same taste takes place, whether it is pus from a sore, or an irritated inflamed surface.

Pus has a smell, in some degree peculiar to itself; but this differs in different cases. Some diseases, it is said, may be known by the smell, as for instance, a gonorrhœa.

Pus sinks in water; mucus floats. Pus communicates to water an uniformly troubled white colour; mucus gives the appearance of stringy portions floating in it. Mucus is said to be more readily dissolved by sulphuric acid, than pus is. It has also been asserted, that if water be added to such solutions, the pus is precipitated to the bottom of the vessel; while the mucus, instead of being completely precipitated, forms swimming flakes. A solution of caustic alkali dissolves both pus and mucus; but, when water is added, the pus is said to become separated, but not the mucus.

Though solutions in chemical menstrua and precipitations, have been thought a test of the distinction, between these two fluids; yet, the method has been thought absurd and unphilosophical. It has been conceived, that all animal substances whatever, when in solution, either in acids or alkalies, would be in the same state, and therefore, that the precipitation would be the same in all. Calcareous earth, when dissolved in muriatic acid, is in that acid in the same state, whether it has been dissolved from chalk, limestone, marble, or calcareous spar, and precipitations from all are the same. Hence, experiments were made on organic, animal matter, such as muscle, tendon, cartilage, liver, and brain; and on inorganic, such as pus and the white of an egg. All these substances were dissolved in sulphuric acid, and precipitated with the vegetable alkali. Each precipitation was examined with such magnifiers, as plainly shewed the forms of the precipitates, all which appeared to be flaky substances. The precipitate by the volatile alkali had exactly the same appearance. The same appearances were seen, when the above kinds of animal matter were dissolved in the vegetable caustic alkali, and precipitated with the muriatic acid. A flaky substance, void of any regular form, composed each precipitate. (*Hunter.*)

Pus does not irritate the particular surface, which secretes it, though it may be very irritating to any other. Hence, no suppurating surface of any specific kind, can be kept up by its own matter. If this had not been the case, no sore of a specific quality, or producing matter of an irritating kind, could ever have been healed. This is similar to every other secretion of stimulating fluids, as the bile, tears, &c. which fluids do not stimulate their own glands, or ducts, but are capable of stimulating any other part of the body. (*Hunter.*)

Whenever a real disease attacks, either the suppurating surface, or the constitution, the production of true pus ceases, and the fluid becomes changed in some measure, in proportion to these morbid alterations. In general it becomes thinner and more transparent, and it partakes more of the nature of the blood, as is the case in most other secretions under similar circumstances. *Sanies* is the term usually applied by surgeons, to pus, in this degenerated state. This unhealthy sort of matter has more of the serum, and, frequently, more of the coagulating lymph in it, and less of the combination, which renders it coagulable by a solution of sal ammoniac. It has also a greater proportion of the extraneous parts of the blood, which are soluble in water, such as salts; and it has a greater tendency, than true pus, to become putrid. Such unhealthy matter may even be irritating to the surface, which produces it.

The discharge, when of an irritating sort, is more stimulating to the adjoining parts, with which it comes in contact, than to its own secreting surface. In this manner, it frequently produces excoriation of the skin, and ulceration. Thus the tears excoriate the skin of the cheek, in consequence of the quantity of salts, which they contain. From this effect, matter has been called corrosive, a

quality, which it has not; the only property which it possesses, being that of irritating the parts, which it touches, so as to cause their absorption. (*Hunter.*)

When the vessels thus lose the power of producing good pus, they also lose more or less the power of forming granulations. This may depend on some deviation from the due structure, and action, which such vessels should possess, in order to be qualified for the performance of these two operations.

Pus, from several circumstances, would appear in general to have a greater tendency to putrefaction, than the natural juices have; but, perhaps, this is not the case with pure pus, which, when first discharged from an abscess, is commonly perfectly sweet. There are, however, some exceptions to this, but these depend on circumstances entirely foreign to the nature of pus itself. Thus, if the abscess had any communication with the air, while the matter was confined in it; or if the collection has been so near the colon, or rectum, as to have been infected by the feces, then we cannot wonder, that the matter should become putrid. When blood is blended with pus; when sloughs are mixed with it; when the parts forming the seat of the abscess, are in a gangrenous state from an erysipelatous affection; the matter has a greater tendency to putrefy, than the pure pus, discharged from sound abscesses, or healing sores. Pure matter, though easily rendered susceptible of change, by extraneous additions, is in its own nature tolerably uniform and immutable. It appears so unchangeable, that we find it retained in an abscess for weeks, without having undergone any alteration. These qualities, however, only belong to perfect pus. If a healthy sore inflames, the matter, now produced from it, though unmixed with extravasated blood, or dead solids, becomes much sooner putrid, and much more irritating, than the discharge, formed before this alteration of the ulcer. (*Hunter.*)

In the preceding paragraph, it is stated, that matter remains very often unchanged in abscesses for weeks. This expression of Hunter's is not strictly correct; for, it is well known, that the surfaces of the cavities of abscesses are always absorbing, as well as secreting ones; consequently, there must be a continual mutation going on in the contained matter.

When there are diseased bones, or other extraneous bodies, exciting irritation, sometimes even to so great a degree as to make the vessels bleed, and often wounding the vessels of the part, the matter is always found to be very offensive. This state of the discharge is one mark of a diseased bone.

The discharge of an unhealthy sore blackens silver probes, and preparations of lead. This effect is imputed by Dr. Crawford to the sulphurated hydrogen gas, generated in the matter. (*Phil. Trans. vol.* 80. *Year* 1790, *p.* 385.)

USE OF PUS.

By some it is supposed to carry off humours from the constitution. Suppuration is sometimes regarded as a constitutional disease, changed into a local one, which constitutional malady is discharged, or thrown out of the body, either in the form of pus, or together with this fluid. Critical abscesses have been thought to be cases of this sort. Suppuration has also been imagined to carry off local complaints from other parts of the body, on the old principle of derivation, or revulsion. For this reason, sores or issues are made in sound parts before allowing other sores to be dried up. Suppuration is sometimes excited with a view of making parts, such as indurated swellings, dissolve into pus; but, we have endeavoured to shew, that no dissolution of the solids is concerned in the production of pus.

A secretion of pus is looked upon as a general prevention of many, or of all, the causes of disease. Hence, issues are made to keep off both universal as well as local diseases. However, the use of pus is perhaps unknown; for, it is formed most perfectly from healthy sores, and in healthy constitutions; and large discharges from parts not very essential to life, produce very little change in the constitution, and as little upon being healed up, whatever some may suppose to the contrary. (*Hunter.*)

This is certainly the case with many old ulcers, the suppuration from which seems to have little, or no effect, in impairing the health. Nor is there any real reason to be afraid of healing such ulcers, when possible, lest a worse disease should follow from the stoppage of the discharge, to which the system is supposed to be habituated so much, that the continuance of such discharge is essential to health.

Every one knows, that when there is no interference of art, that is, when the surface of a sore is left uncovered, the thin part of the matter evaporates, and the thick part dries and forms a scab. Nature, therefore, seems to have designed, that one use of pus should be to make a cover, or protection, for ulcerated surfaces. But I cannot agree with what has been asserted (*Hunter*), that the natural healing of a sore under a scab takes place more quickly, than when surgical dressings are employed.

Among the secondary uses of sup-

puration, may be mentioned, opening a communication between a disease and the external surface of the body; forming a passage for the exit of extraneous bodies, &c.

TREATMENT WHEN SUPPURATION MUST TAKE PLACE.

In cases of inflammation, arising from accident, but so circumstanced, that we know suppuration cannot be prevented, the indication is to moderate the inflammation, which, if the powers are great, and the injury done considerable, will probably be very violent. If the constitution should also be much affected, certain general means are proper, such as bleeding, purging, and nauseating medicines. While the constitution continues to be disturbed, suppuration cannot take place in the most favourable manner. In these cases, also, such medicines as produce a gentle perspiration greatly relieve the patient, for instance, the pulv. ipecac. comp.; antimonials; aq. ammon. acet.; saline draughts, &c. Opiates may produce a temporary diminution of action; but, this is not always the consequence of this medicine, as there are constitutions, which it renders more irritable, and of course it aggravates the inflammatory action.

The applications to inflammations, which are to suppurate and form an abscess, commonly used, are poultices and fomentations. These, however, appear to be appliedwithout much critical exactness, or discrimination; for, they are applied before suppuration has taken place, and when this event is not desired; and they are also applied after suppuration has taken place. With respect to suppuration itself, abstracted from all other considerations, the indication cannot be the same in every state; but, if poultices and fomentations are found to be of real service in the two stages of the disease, there must be something common to both, for which they are of service, independently of simple suppuration. Poultices are useful, when the inflammation attacks the skin, either in the first instance or after an abscess has approached so near the skin, that this becomes secondarily affected. This benefit appears to arise from the skin being kept soft and moist. Such is the use of a poultice in inflammation, either before or after suppuration, until the abscess is opened. But, when poultices and fomentations are applied to inflamed parts, in which we wish to avoid suppuration, reason and principle will not justify the practice, though such applications may be proclaimed by experience to be very proper. (*Hunter.*)

TREATMENT AFTER SUPPURATION HAS TAKEN PLACE.

When suppuration cannot be stopped, or resolved, it is in general to be promoted.

How far suppuration can be increased by medicines, or applications, is doubtful; but attempts are generally made, and, for this purpose, suppurating cataplasms and plasters, composed of the warm gums, seeds, &c. have been recommended. Mr. Hunter doubted, whether such applications had any considerable effect in the way intended; for, if they were put on a sore, they would hardly increase the discharge from it, and, perhaps, even diminish it. However, in many cases, in which the parts are indolent, and hardly admit of true inflammation, in consequence of which a perfect suppuration cannot take place, stimulating the skin brings on a more salutary inflammation, and of course a quicker inflammation.

These applications have been found, however, to bring the matter more quickly to the skin, even in the most rapid suppurations. This effect has been mistaken for an increased formation of pus; but, this consequence can only follow in cases, in which the inner surface of the abscess is within the influence of the skin. The accelerated progress of the matter to the surface of the body arises from another cause, viz. the promotion of ulceration in the parts, between the collection of matter, and the cuticle.

Emollient poultices are commonly applied to inflamed parts, when suppuration is known to have taken place. These can have no effect upon suppuration, except that of lessening the inflammation, or rather making the skin more easy. The inflammation must have reached the skin before poultices can have much effect, for they can only affect that part. The ease of the patient, however, should be considered, and we find, that fomentations and poultices are often beneficial in this way. By keeping the cuticle moist and warm, the sensitive operations of the nerves of the parts are soothed. On the contrary, if the inflamed skin is allowed to dry, the inflammation is increased, and as suppuration is probably not checked by the above treatment, it ought to be put into practice. As warmth excites action, the fomentation should be as warm as the patient can bear, without inconvenience. (*Hunter.*)

OF THE TIME WHEN ABSCESSES SHOULD BE OPENED.

As abscesses, wherever formed, must

increase that part of their cavity, which is next to the skin, more quickly than the bottom, they must become, in some degree, tapering towards the latter part, with their greatest breadth immediately under the skin. This shape of an abscess, when allowed to take place, is favourable to its healing, for it puts the bottom, which is the seat of the disease, more upon a footing with the mouth of the abscess, than it otherwise could be. As the bottom, or part, where the abscess began, is more or less in a diseased state; and as the parts between the seat of the abscess and the external surface are sound parts, having only allowed a passage for the pus, they, of course, have a stronger disposition to heal, than the bottom has.

To keep the mouth of an abscess from healing before its bottom, the collection of matter should be allowed to break of itself; for, although abscesses in general only open by a small orifice, more especially when sound, yet, in such cases, the skin over the general cavity of the matter is so thinned, that it has very little tendency to heal, and often ulcerates and makes a free opening. If the latter event should not spontaneously occur, it may now be more easily obtained by the interference of the surgeon.

Abscesses, which are the most disposed to heal favourably, are the quickest in their progress to the skin, and the matter comes to the surface almost at a point; the swelling is not so conical as in other cases, and when it bursts, the orifice is exceedingly small. On the other hand, when there is an indolence in the progress of the abscess, the collection spreads more, or distends the surrounding parts in a greater degree, in consequence of their not being so firmly united by inflammation, in the one as they are in the other instance; nor will ulceration so readily take the lead, and the matter will come to the skin by a broad surface, so as to thin a large portion of the cutis. (*Hunter.*)

It may certainly be set down as a general axiom, that all phlegmonous abscesses should be allowed to break, and not be opened by the surgeon. When punctured unnecessarily, or prematurely, they never heal so favourably as when left to themselves.

Particular cases, however, should be opened, as soon as the existence of matter is ascertained. Abscesses should only be allowed to burst of themselves, when the confinement of the matter can do no mischief. Abscesses in the abdomen, or thorax, under the cranium, in the eye, and joints, should be mostly opened very soon. When suppuration takes place beneath ligamentous expansions, or aponeuroses, which invariably retard the progress of the matter to the surface of the body, an early opening should be made. If this be not done, the matter spreads to a great extent, separating such ligamentous expansions from the muscles, and the muscles from each other, and, as the pus cannot get to the surface of the body, the length of the disorder is of course increased. When matter is so situated, as to be liable to insinuate itself into the chest, or abdomen, or into the capsular ligaments of the joints, it is highly proper to prevent this extension of mischief, by making a timely opening into the abscess.

OF THE PLACE WHERE THE OPENING SHOULD BE MADE.

If a free opening is not required, or making one is not practicable, it is at least proper to make whatever opening can be made in a depending situation. By this means, the matter will more readily escape, and all pressure arising from the confinement or lodgment of pus, will be prevented. A very small degree of pressure on that side of the abscess which is next to the skin, may produce ulceration there; and although such pressure might not, in many cases, be so great as to produce ulceration at the bottom of the abscess; yet it may be sufficiently great to prevent granulations from forming on that side, and thereby retard the cure, as no union can take place, but by means of granulations. The pressure is always most, and retards the formation of granulations in the greatest degree, at the most depending part of the abscess. Hence, if no opening be made in this situation, the upper part of the abscess readily heals to a small point, which becomes a fistula.

When circumstances forbid making an opening at the most depending part of an abscess, perhaps, nothing more can be done, than to evacuate the matter as often as necessary, and gently to compress the sides of the abscess together, when the situation of the case admits of the practice.

But abscesses are not always to be opened at the most depending part. The distance between the matter and the skin at this part is the common reason against the method. If an abscess is rather deeply situated, and points in a place which is higher than where the collection lies, it is proper to make the opening where the conical eminence, or, as it is termed, the *pointing*, appears. Thus, if an abscess should form in the centre of the breast, and point at the uppermost part, which is often the case, it would be improper to cut through the lower half of the mamma, in order to make a passage for the matter in that direction. If an

abscess should form on the upper part of the foot, it would be wrong to make an opening through the sole of the foot to get at the most depending part of the abscess; for, besides cutting such a depth of sound parts, a great many useful ones would be destroyed.

When the abscess does not point in a depending situation, as in the instances just cited, since the place where the matter threatens to open a passage, is likely to be the future opening, and this situation is disadvantageous to the healing of the deep part of the abscess, it is generally best to let the collection of matter first burst of itself, and then dilate the opening as freely as necessary. By allowing abscesses to burst spontaneously, the opening is not so apt to heal as if made by art, and, therefore, is better in such situations. (*Hunter.*)

In some cases, it is more advantageous even to cut through a certain thickness of parts, for the sake of obtaining a depending opening, than to make an opening, where the pointing appears, as the parts are most attenuated, and the matter nearest the surface. This remark is highly worthy of remembrance, when there is no doubt of the existence of matter at the depending place, and when the parts to be divided are not important ones. Collections of matter beneath the fasciæ of the fore-arm and thigh, particularly demand attention to this direction, as they commonly point where those ligamentous expansions are most attenuated, not where the matter can most readily escape.

Abscesses in the sheath of the rectus abdominis should also be opened in a low situation.

DIFFERENT METHODS OF OPENING ABSCESSES.

All abscesses will burst of themselves, unless the matter should be absorbed, and, in general, they ought to be allowed to take this course. There are, however, as we have already explained, particular circumstances which require an early opening; but, when the skin over the abscess is very thin, it is not of so much consequence, whether the case be permitted to burst of itself, or it be opened by the surgeon.

When abscesses are large, it is generally necessary to open them by art, whether they have burst of themselves or not; for, the natural opening will seldom be sufficient for the completion of a cure; and, although it may be sufficient for the free discharge of the matter, yet these abscesses will heal much more readily when a free opening is made; for, the thin skin over the cavity granulates but indifferently, and therefore unites but slowly with the parts underneath. (*Hunter.*)

Abscesses may be opened either by an incision, or by making an eschar with caustic. To the latter plan, however, many urge strong objections: the use of caustic is not usually attended with any advantage which may not be obtained by a simple incision; upon a tender inflamed part it gives much more pain; it is more slow in its effects; and the surgeon can never direct the operation of the caustic so accurately as to destroy exactly the parts which he wishes, and no more. If the eschar be not made deeply enough, the lancet must, after all, be used. Caustic also leaves, after its application, a disagreeable scar, a consideration of some importance in opening abscesses about the female neck or face. To these numerous objections we have to add, that the eschar is, very frequently, ten or twelve tedious days in becoming detached.

When there is a redundance of skin, or when there is a good deal of it thinned, however, an opening made with caustic will answer, perhaps, as well as an incision. The application of a caustic may also sometimes be advantageously resorted to when there is a good deal of indolent hardness around a small abscess.

The *calx viva cum kali puro*, or the *kali purum* alone, is the best caustic for opening abscesses. The part is first to be covered with a piece of adhesive plaster, which has a portion cut out exactly of the same figure and size as the opening intended to be made in the abscess. The best way of making the eschar, is to dip the end of the caustic in water, and to rub it on the part till the skin becomes brown. The active substance is then to be immediately washed off with some wet tow, the plaster is to be removed, and an emollient poultice applied.

In almost all cases, it is better to use the lancet, or double-edged bistoury. Either of these instruments opens the abscess at once, and with less pain, than results from the use of caustic; it occasions no loss of substance, consequently a smaller cicatrix; and, by using it, the opening may be made in the most advantageous direction, and of the exact size required.

DRESSINGS AFTER OPENING ABSCESSES.

When an abscess has burst of itself, and it is unnecessary to enlarge the opening, all that is requisite is to keep the surrounding parts clean. The continuation of the same kind of poultice, which was before used, is, perhaps, as good an application as any; and when

the tenderness, arising from the inflammation, is over, lint and a pledget may be made use of, instead of the poultice.

But, an abscess, opened by a cutting instrument, is both a wound and a sore, and partakes more of the nature of a fresh wound in proportion to the thickness of the parts cut. Hence, it is necessary that something should be put into the opening to keep it from healing by the first intention. If it is lint, it should be dipped in some salve, which will answer better than lint alone, as it will allow of being taken out sooner. This is advantageous, because such sores should be dressed the next day, or, at latest, on the second day, in order that the pus may be discharged again. When the cut edges of the opening have suppurated, which will be in a few days, the future dressings may be as simple as possible, for nature will, in general, complete the cure.

If the abscess has been opened by caustic, and the slough has either been cut out or separated of itself, the case is to be regarded as an entire suppurating sore, and dressed accordingly.

Perhaps, dry lint is as good a dressing as any, till the nature of the sore is known. If it should be of a good kind, the same dressing may be continued; but, if not, then it must be dressed accordingly. Parts, which at first appear to be sound, sometimes assume every species of disease, whether from indolence, from irritability, from scrophulous, and other dispositions. This tendency to disease arises, in some cases, from the nature of the parts affected, as, for instance, bone, ligament, &c. (*Hunter.*)

It is impossible to refer the reader, in a satisfactory manner, to any particular works for information concerning abscesses and suppuration, because something is to be met with on the subject in almost every surgical book, ancient as well as modern. The author of the article *Abscess* in Rees's Cyclopædia, makes particular mention of the following writers: Severinus, Hildanus, Wiseman, Heister, Van Swieten, Sharp, Pott, B. Bell, and Kirkland. Some curious cases are said also to be related, or referred to, in the *Bibliothèque Choisie de Médecine*, the compilations of Mangetus, Bernstein, and James; the memoirs and transactions of different learned societies (the *Mém. de l'Acad. de Chir.* might be especially mentioned); and in the works of Bonetus, Forestus, Lusitanus, Tulpius, Morgagni, Horstius, Stalpart, Vander Wiel, &c.

I am rather surprised, that the author of the article above alluded to, should have neglected to notice John Hunter's *Treatise on the Blood, Inflammation, &c.* a work, in which, perhaps, more interesting knowledge, respecting abscesses and suppuration, is contained, than in any other one ever published. The *Traité de la Suppuration de F. Quesnay*, 1749, is also entitled to some attention; so are the *Dissertations on Inflammation by J. Burns.* Richter has written a tolerable chapter on the subject, in his *Anfangsgr. der Wundarzn. band.* 1. Consult also *Home on Pus*, and *l'Encyclopédie Méthodique.*

SURGERY. (*Chirurgery*; from χειρ, the hand, and εργον, labour.) A branch of the science of medicine, having for its principal object the cure of external diseases. The etymological meaning of the word *surgery* reduces this part of the medical profession to a very degraded condition, and, by no means conveys an adequate idea of what it really is at the present day. They who consider surgery merely as the mechanical part of medicine, or as that branch of it which consists entirely in the performance of manual operations, must either be very ignorant, or very prejudiced and illiberal. In order to remove these foolish notions, it is only necessary to ask, by what dexterity of the hand could the surgeon accomplish the cure of the various forms of the venereal disease, and of numerous scrophulous affections? Yet these, and many other disorders, equally incurable by the hand alone, fall to the province of the surgeon, and by him are oftentimes successfully treated.

A modern author observes, that "many people have imagined, that when a man has learnt the art of dressing sores, of applying bandages, and performing operations with a little dexterity, that he must necessarily be an accomplished surgeon. If a conclusion so gross and fallacious had been confined to the vulgar and illiterate, the progress of scientific surgery would have suffered little interruption; but if young minds are directed to these objects, as the only important matters upon which their faculties are to be exercised; if the gross informations of sense constitute the sum of their knowledge, little more can be expected from such a mode of study, than servile imitation, or daring empiricism. Indeed, some people have affected to oppose surgery as an *art* to medicine as a *science*; and if their pretensions were justly founded, the former would certainly be degraded to a mere mechanical occupation. But, it is not very easy to comprehend the grounds of such a distinction. The internal and external parts of the body are governed by the same general laws during a state of health; and, if an internal part be attacked with inflammation, the appearances and effects will bear a great similarity to the same disease situated externally; nor are the

indications of cure, in general, materially different. If by science, therefore, be meant "a knowledge of the laws of nature," he who knows what is known of the order and method of nature, in the production, progress, and termination of surgical diseases, merits as justly the title of a scientifical practitioner, as the well-educated physician. The practical parts of physic and surgery are very frequently disunited; but, their theory and principles are indivisible, since they truly constitute one and the same science." (*Pearson's Principles of Surgery, Preface.*)

We shall next introduce a short account of the rise and progress of surgery, as given by Mr. Gooch, in the first volume of his Chirurgical Works.

Writers have divided surgery into these six branches: Synthesis; Diæresis; Exæresis; Aphæresis; Prosthesis; and Diorthrosis: the first signifies uniting parts divided; the second, dividing parts united; the third, removing, or extracting, extraneous, or other noxious substances, lodged in any part of the body; the fourth, taking away what is superfluous; the fifth, supplying deficiency; the sixth, restoring parts to their proper places.

The daily instances of the relief, which surgery brings the afflicted, under the various circumstances of distress, even delivering them from the jaws of death, sufficiently proclaim its excellence; and it appears to be of much earlier date, than the other parts of the medical art.

We see, by the antediluvian history, that soon after the creation of the world, feuds and animosities, envy and malice, possessed the minds of men, and were productive of rapine and war, which inevitably exposed the contending parties to wounds, and other external injuries. Reason, implanted in man for his preservation, as the first principle in nature, directed him, on various occasions, to seek a remedy; and this necessity gave rise to surgery, which, at first, was rude and imperfect, gradually growing, in successive ages, like other ingenious arts and sciences, to a state of perfection.

The inhabitants of the earth, in the primitive ages of the world, lived frugally, upon plain simple food, according to the dictates of nature and right reason; and enjoying a pure serene air and temperate climate, their lives were protracted to a great length, without being so subject as we are to diseases, which have been much increased since that time by luxury and intemperance. They were peculiarly happy in the enjoyment of robust and vigorous constitutions, raised from good original stamina; and, when attacked with diseases, nature wanted little or no assistance from art, to restore their health; consequently surgery was then looked upon, as almost the only necessary branch of medicine.*

Ancient history informs us, though there may be something fabulous and allegorical in it, that Apollo communicated his skill in this science to his son Æsculapius, who then profited under the tuition of Chiron the Centaur; and for his great improvement and knowledge of surgery in particular, he was deified, and had temples dedicated to him in several parts of the world. Many countries contended for the honour of his birth, and, according to the learned, his name signifies a man of the knife, in the Phenician language; whence some writers conclude he was a native of Phenicia; but this controverted point, whether he was by birth a Phenician, an Egyptian, or a Grecian, is not material to our purpose. In those early days, there were no regular professors of the medical art, the knowledge of which was then conveyed by oral tradition, or recorded upon pillars in the most public places, or on the walls of temples, dedicated to the god of Health; and afterwards registers of cures were kept in those consecrated places for the general good of mankind.

Machaon and Podalirius, the sons of Æsculapius, were both medical and military men, and being particularly skilful in surgery, they proved very useful to the soldiers in curing their wounds, in the Trojan war; on which account, when Machaon himself was dangerously wounded with a dart, greater lamentation was made for him than for any other hero.

From the destruction of Troy to the Peloponnesian war, which was an interval of more than seven hundred years, the Asclepiadæ, descendants of Æsculapius, and their disciples, were the only noted professors of the healing art.

About the conclusion of this period of time, the immortal Hippocrates began to be famous in the world, who was also of the Æsculapian family, and lived between four and five hundred years before our Saviour. He was endowed with the greatest sagacity, excelled all his predecessors and contemporaries, and reduced this science into better order, compiling, and laying down for posterity, rules founded upon his own observations, confirmed by experience, and was deservedly called the father of physic. In his writings he also treats of wounds, ulcers, fractures,

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* Vid. Dissertat. physico-med. Fred. Hoffmanni de Methodo acquirendi Vitam Longam. The great luxury of the Romans in Seneca's time made him say, *Non ad rationem, sed ad similitudinem vivimus.*

&c. interspersing observations and remarks through the whole, to direct the judgment and practice of succeeding ages. He was the ablest surgeon, as well as physician, of his time.

The other Greek physicians, whose writings have been transmitted to us in a more universal language, treating also professedly of surgery, are Oribasius, Alexander, Trallianus, Ætius, and Paulus Ægineta, and the great Galen, who flourished more than a century before Oribasius.*

Among the Romans, Celsus, a man of a sublime and penetrating genius, is the only author we have in his time, though he mentions several; but, there is no other record, or monument, of them left. Both he and Galen, who was a practitioner of great repute at Rome, though a native of Pergamus, in Asia Minor, speak of some ancient surgeons, as well in Egypt as in other parts of the world, whose works have perished.

When the knowledge of arts and sciences was transferred from Egypt to Greece, it received great improvements, and Athens was looked upon as the seat of all kinds of learning, till the death of Alexander the Great; after which æra, the Ptolemies ruled in Egypt, and Alexandria became the most renowned school in the world, for physic, surgery, and anatomy, which flourished near a thousand years: and, in those days, physicians boasted of receiving their education in that university. Then the different branches of medicine were practised together, and not separated till the time of Herophilus and Erasistratus, who were educated at Alexandria, and lived in the reign of Seleucus Nicanor, king of Syria, as appears by a memorable incident, in respect to the latter of those illustrious men, who shewed his great penetration in discovering Antiochus's distemper, when fallen desperately in love with his mother-in-law, the young and beautiful Stratonice, Seleucus's second wife, whom he had married in his old age.†

In the year 640 of the Christian æra, the caliph of the Saracens, professed enemies to literature, as well as to the Christians, took Alexandria, destroyed the university, and burnt the library of Ptolemy Philadelphus, which was the greatest magazine of learning in the world, said to contain 700,000 volumes;* however, some books might be saved out of that lamentable conflagration.

In the same century, that this dreadful catastrophe happened at Alexandria, Europe was over-run with Goths and Vandals, by which calamitous event, the liberal arts and sciences also suffered very much; and undoubtedly medicine shared the same fate.

After the fall of Alexandria, and the irruptions of the above barbarous people, the Arabians, having collected libraries, and probably possessed themselves of some books, that were saved out of the flames at Alexandria, became more conspicuous and considerable in this science, than any other nation; of which, the most eminent, who blended surgery with their other medical writings, were Rhazes, Avicenna, Avenzoar, Averrhoes, and Albucasis.

Rhazes probably was born in the province of Chorasan in Persia; he was superintendant of an hospital there, and died advanced in years, A. C. 932.

Avicenna was the next writer of note among the Arabians; he was born at Bochara in Chorasan, towards the end of the 9th century. He resided and practised at Ispahan. He was a man of extraordinary talents; but, shortened his days by intemperance and indulgence in pleasures; he was buried at Hamadan.

Avenzoar succeeded Avicenna; if not born, he resided much at Seville, the capital of the province of Andalusia in Spain, then the seat of the Mahometan caliph. He lived and enjoyed good health to 135 years.

Averrhoes followed Avenzoar; he was a native of Corduba in Spain, and died at Morocco.

Of Albucasis the place and time of nativity do not certainly appear; but he comes after Averrhoes, and was the best acquainted with surgery of any of the Arabians. There is reason to suppose that he lived in the 11th or 12th century of the Christian æra.

These Arabians were favourers of Galen's doctrine, and their authority prevailed unrivalled for many ages.

Afterwards the chemists opposed the Galenists, each of which had zealous partisans, who were bigoted to the opinion of their chiefs, and combated each other's notions with great vehemence, whence a

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* Oribasius was a practitioner of great note at Sardis, in Cent. IV. Æ. C.—What he has said, de Laqueis et Machinamentis, in his voluminous works, is chiefly taken from Heliodorus.—It appears, that Paulus was a more considerable surgeon, having improved upon his predecessors.

† Seleucus began his reign Ao. Mdi. 3684. Erasistratus resided at his court, and was archiater.

* Great part of the Ptolemean library having been burnt in the wars between Cæsar and Pompey, the loss was supplied, as far as possible, by Cleopatra, queen of Egypt, and her successors, at an immense expence.

kind of schism arose in the province of physic; but the wiser moderns have freed themselves from implicit faith, and the embarrassments of hypotheses, and fine speculative systems, more curious than useful, regarding only what is founded upon rational experience, to which theory must be subordinate.

In the 13th century, learning emerged from the dark clouds of ignorance, under which it had long been veiled; and about this period of time, the reformation of surgery was begun in England by Arden,* originally a practitioner of great fame at Newark, and afterwards in London: and it was begun rather earlier in France, by Pitard and Lanfranc.† By a succession of men of genius, learning and application here, such as Gale, Clowes, Woodall, Banister, Wiseman, and many others; and there, by Vavasseur, Mondeville, Guido de Cauliaco, Paré, Guillemeau, &c. surgery was gradually advanced, in both countries, to its present state of perfection. Pitard was a Parisian by birth; but Lanfranc was a native of Milan, educated at Salernum, the most famous university for physic and surgery in those days, as its motto, *Civitas Hippocratica*, emphatically expresses. He was driven from Italy, with many other learned men, by the dreadful factions of the Guelphs and Gibelines, at the conclusion of the 12th century, and found an asylum at Paris, where he met with a very honourable reception. His acquaintance with Pitard was soon improved into a strict friendship, which was inviolably preserved, for the public good, between these eminent men, who, co-operating, supported with great credit and dignity, the college of St. Côme, founded by Lewis the Ninth, who was sainted for engaging in the crusades; and public lectures were appointed to be read, and demonstrations made, in anatomy and surgery, by the royal founder. Pitard having given early proofs of his extraordinary talents and abilities in his profession, was honoured, before he was thirty years of age, with the appointment of first surgeon to the king, and standing in the highest esteem, attended him in his expedition to the Holy-Land, where he gathered laurels, and returned loaded with honours.

Our neighbours having had for some ages, better opportunities, from royal patronage, of acquiring knowledge in their profession, than other countries, and being regular in giving lectures, and making demonstrations in anatomy and surgery, they distinguished themselves, and were deservedly extolled throughout Europe; and from every part of it, surgeons used to resort to Paris, to complete their education; which city now can no longer claim the superiority to London.

In the foreign universities, the professors of physic generally adopted surgery; and now, at the famous university of Edinburgh, and others, there are professorships appropriated to surgery and anatomy conjointly. Marianus Sanctus, a celebrated lithotomist, was a doctor of Padua. Marcus Aurelius Severinus, Vigo, Fabricius ab Aquapendente, Cæsar Magatus, Marchetti, and many other practical surgeons, that might be enumerated, were doctors of physic. Mons. Le Cat, at Rouen, and Mons. Pouteau, at Lyons, chief surgeons to the great hospitals in those cities, are styled doctors of physic and surgery. The late illustrious M. De La Peyronie, who was first surgeon to the king, and to whom the whole faculty is greatly indebted, was bred, and took a doctor's degree in the university of Montpelier. Some of the physicians to the kings of France were originally surgeons, in which country singular marks of royal favour have, for many ages, been conferred upon surgeons, as we have observed; and by a late edict, upon the establishment of the Royal Academy of Surgery at Paris, no surgeon is allowed to practise, and be master of his company, without having taken a master of arts' degree in some university of that kingdom.*—The great Fabricius Hildanus, who flourished in the 15th century at Bern, in Switzerland, was physician and surgeon in ordinary to that illustrious republic, and to the marquis of Baden. He stands at the head of the first class of observators, and should be in the hands of every practitioner. (*Chirurgical Works of B. Gooch, Vol.* 1.)

Perhaps, nothing contributed so materially to the improvement of surgical knowledge, as the establishment of the Royal Academy of Surgery in France; a noble institution, which, for a long while, gave the French infinite advantage over us, in the cultivation of this most useful profession. Indeed, every one, truly interested in the improvement of surgery, cannot fail to regret the discontinuance of a society, in which emulation and talents were so long united for the benefit of mankind. The various dissertations, published by the illustrious members of

* Vid. Opera I. Friend, M. D. de Historia Medicina.

† See Histoire de l'Origine & des Progrès de la Chirurgie en France.

* See Histoire de l'Origine & de Progrès de la Chirurgie en France; where great encouragement for the improvement of surgery appears to have been given by royal edicts, in different ages.

the academy, will serve as a perpetual memorial of the spirit, ability, and success, with which the objects of the institution were pursued; and, centuries hence, practitioners shall reap from the pages of its memoirs the most valuable kind of surgical information. Unfortunately, this celebrated establishment, which was overthrown by the agitation of the French revolution, has had only a very inferior substitute in the Ecole de Santé.

Were I to name any one thing, which, in my opinion, would have the greatest influence in giving life to the study and cultivation of surgery in this country, I should certainly assign such importance to the establishment of an institution in this metropolis, on the same grand, and encouraged plan, as the late Royal Academy of Surgery in France.

Within the last twenty, or thirty years, most important improvements have certainly been made in almost every branch of surgery; and, it must gratify every Englishman to find, that his own countrymen have acted a very leading part in effecting an object, in which the interests of mankind in general are so deeply concerned.

External aneurisms, which formerly used to prove nearly as fatal as internal ones, are now treated with immense success, by operating upon the plan first suggested by Mr. Hunter, and of late very materially improved by Mr. Abernethy. The doctrines of this disease have also been recently elucidated, with great ability, by Professor Scarpa, of Padua.

The diseases of the eyes, to which affections English surgeons seemed to pay much less attention, than was bestowed by foreign practitioners, seem now to obtain due attention in this country. Although we have generally had some distinguished oculists, our surgeons at large have been wonderfully ignorant of this part of their profession, and, uninformed in the subject, they have given up to professed oculists, and quacks, one of the most lucrative and agreeable branches of practice. However, the able writings of Wenzel and Ware begin now to be familiarly known among practitioners: and the observations of Scarpa, Richter, Wardrop, Saunders, &c. will soon have immense effect in diffusing in the profession a due knowledge of the numerous diseases, to which the organs of vision are liable.

Before Mr. Hunter, our ideas of the venereal disease were surrounded with absurdities; and it is to this luminary that we are in an eminent degree indebted, for the increased discrimination, and reason, which now prevail, both in the doctrines and treatment of the malady.

Strictures in the urethra, an equally common and distressing complaint, were not well treated of, before Mr. Hunter published on the venereal disease; and the infinite advantage of armed bougies, in the treatment, has been subsequently described by Mr. Home.

I must not omit to mention, among the most modern improvements in surgical science and practice, the discoveries of Dr. Jones, relative to the subject of hemorrhage. Very important practical inferences are to be drawn from his experiments.

Ruptures, those common afflictions, in every country, have in modern times received highly interesting elucidations from the labours of Camper, A. Cooper, Hey, Gimbernat, Scarpa, &c.

The treatment of injuries of the head has been materially improved by Quesnay, Le Dran, Pott, Abernethy, &c.

The disease of the vertebræ, which occasions paralysis of the limbs, formerly always baffled the practitioner; but, the method proposed by Mr. Pott, is now frequently found productive of considerable relief, and sometimes of a perfect cure.

The mode of treating lumbar abscesses has been rendered much more successful, than formerly, and, for this change, the world is greatly indebted to Mr. Abernethy.

The almost infallible plan of curing hydroceles, by an injection, in the way described by Sir James Earle, may also be enumerated among the recent improvements.

I shall conclude this article with noticing the increasing aversion to the employment of the gorget in lithotomy, and the many distinguished advocates for the use of a common scalpel in this operation. These latter circumstances I hail as propitious omens of very beneficial changes in this part of surgery.

SUPPURATIVES. (from *suppuro*, to suppurate.) *Suppurantia*. Medicines, or rather applications, which promote the formation of good pus.

SUSPENSORY. (from *suspendeo*, to suspend.) *Suspensor*. A bandage for containing, and supporting the scrotum; a bag-truss. Bandages of this kind are now usually sold at the shops, and seldom made by surgeons themselves; therefore, a particular description of them is not essential in this work. In cases of hernia humoralis, varicocele, cirsocele, some particular ruptures, and several other affections of the testicle, and spermatic chord, a suspensory bandage is of infinite service.

SUTURES. (from *suo*, to sew.) A suture, in surgery, means a mode of uniting the edges of a wound, by keeping them in contact with stitches.

Mr. Sharp remarks, that, "when a wound is recent, and the parts of it are divided by a sharp instrument, without

any further violence, and, in such manner, that they may be made to approach each other, by being returned with the hands, they will, if held in close contact for some time, reunite by inosculation, and cement, like one branch of a tree ingrafted on another. To maintain them in this situation, several sorts of sutures have been invented, and formerly practised, but the number of them has, of late, been very much reduced. Those now chiefly described are the *interrupted*, the *glover's*, the *quilled*, the *twisted*, and the *dry*, sutures; but, the interrupted and twisted are almost the only useful ones, for the quilled suture is never preferable to the interrupted; the dry suture is ridiculous in terms, since it is only a piece of plaster, applied in many different ways, to reunite the lips of a wound; and the glover's, or uninterrupted stitch, which is recommended in superficial wounds, to prevent the deformity of a scar, does rather, by the frequency of the stitches, occasion it, and is therefore to be rejected, in favour of a compress and sticking plaster." (*Oper. of Surgery.*) The twisted suture is described in speaking of the *hare-lip*; and *gastroraphe*, which also properly belongs to the present subject, forms a distinct article in this Dictionary.

INTERRUPTED SUTURE.

The wound being cleansed from all clots of blood, and its lips being brought evenly into contact, the needle, armed with a ligature, is to be carefully carried from without, inwards to the bottom, and so on from within outwards. Care must be taken to make the puncture far enough from the edge of the wound, lest the ligature should tear quite through the skin and flesh. This distance, according to Mr. Sharp, may be three, or four-tenths of an inch. The other stitches required are only repetitions of the same process. The threads having been all passed, you are in general to begin tying them in the middle of the wound; though, if the lips be held carefully together, (says Mr. Sharp,) it will not be of great consequence, which stitch is tied first. (See *Operations of Surgery, Chap.* 1.)

Surgical writers in general state, that the number of stitches must, in a great measure, depend upon the extent of the wound. The common rule is, that one suture is sufficient for every inch of the wound; but, that, in some instances, a stitch must be more frequently made, particularly when a wound gapes very much, in consequence of a transverse division of muscles. As we have already explained, it is necessary to pierce the skin, at a sufficient distance from the sides of the wound, lest the thread should cut through the flesh in a short time: but, though Mr. Sharp lays down the necessary distance, in general, as three, or four-tenths of an inch, and others advise the needle to be always carried through the deepest part of the wound, we must receive these directions, particularly the last, as subject to numerous exceptions. When a wound is very deep, it would be conspicuously absurd, and even, in many instances, dangerous, to drive the needle through a vast thickness of parts. Other wounds, of considerable length, might not be, in some places, four-tenths of an inch deep; though it is true, sutures could never be requisite at such points.

The needles for making the interrupted suture will pass, with the greatest facility, when their shape corresponds exactly with the segment of a circle, and they should always form a track, of sufficient size, to allow the ligatures, which they draw after them, to pass through the flesh with the utmost ease.

The interrupted suture obviously receives its name from the interspaces between the stitches; and it is the one most frequently employed. Its action is always to be assisted, and supported, either with the uniting bandage, (see *Bandage*,) or with strips of adhesive plaster, compresses, &c.

QUILLED SUTURE.

As Mr. John Bell has observed: "when the wound was deep among the muscular flesh, the old surgeons imagined, that so large a wound could not be commanded by the common interrupted suture, however deep the stitches might be driven among the flesh; they were, besides, fearful of using the continued (glover's) suture in deep gashes, lest the wound should be made to adhere superficially, while it was still open within, forming perhaps a suppuration, or deep collection of matter. They believed, that a deep muscular wound could not be safely healed, without a degree of suppuration; while they wished to bring it together at the bottom, they were afraid to close it very exactly at the mouth, lest the matter should be collected in the deeper parts of the wound; it was, for this purpose (says Mr. John Bell) that they used, what they called the *compound*, or *quilled suture*. It is merely the interrupted suture, with this difference, that the ligatures are not tied over the face of the wound, but over two quills, or rolls of plaster, or bougies, which are laid along the sides of the wound. In performing this suture, we make first two, three, or four stitches, of the interrupted suture very deep, and then, all the ligatures being put in, we lay two bougies along the sides of the wound, then slip

one bougie into the loop of the ligatures on one side, drawing all the ligatures from the other side, (Mr. Bell should rather have said towards the other side,) till that bougie is firmly braced down. Next we lay the other bougie, and make the knots of each ligature over it, and draw it also pretty firm; and thus the ligatures, in form of an arch, go deep into the bottom of the wound, and hold it close, while the bougies, or quills, keep the middle of the wound, and lips of it pressed together, with moderate closeness, and prevent any strain upon the threads, or any coarse and painful tying across the face of the wound." In a note Mr. J. Bell says, that Dionis violently reprobates the quilled suture; but, that De la Faye (the annotator on Dionis) says, it is good for deep muscular wounds. The quilled suture is now scarcely ever employed; nor has it any advantages, except, perhaps, in some wounds of the belly. (See *Principles of Surgery*, *Vol.* 1, *p.* 59.)

I think the reader will more easily comprehend the manner of making the quilled suture, by directing it to be done as follows: Take as many needles, as stitches intended to be made; arm them with a double ligature, or one capable of being readily split into two; introduce the ligatures through the wound; cut off the needles; lay a piece of bougie along one side of the wound, and tie the ends of the ligatures over it. Next draw the other extremities of the ligatures, so as to bring the first piece of bougie into close contact with the flesh; lay the second piece of bougie along the opposite side of the wound, and tie the other ends of the ligatures over it, with sufficient tightness.

GLOVER'S SUTURE.

This had also the name of the continued suture. It was executed by introducing the needle first into one lip of the wound, from within outwards, then into the other in the same way; and, in this manner the whole track of the wound was sewed up.

The glover's suture has long been rejected by all good surgeons, as improper to be employed in cases of common wounds. It was not, however, till very lately, that this suture was totally abandoned; for, Mr. Sharp, and several eminent writers, since his time, have advised its adoption in wounds of the stomach and intestines. From what we have said in the articles *Abdomen*, and *Hernia*, the reader will perceive, that even in such particular instances, the glover's suture would not be advisable; so that it may, in every point of view, be now considered as totally disused in every case of surgery, which can possibly present itself. When we remember, in making this suture, how many stitches are unavoidable; how unevenly, and in what a puckered state, the suture drags the edges of the skin together; and what irritation it must produce; we can no longer be surprised, at its now being never practised on the living subject. It is commonly employed for sewing up dead bodies; a purpose for which it is well fitted; but, for the honour of surgery, and the sake of mankind, it is to be hoped, that it will never again be adopted in practice.

FALSE OR DRY SUTURE.

This term signifies the retaining of the edges of wounds in contact, by means of sticking plaster, in various manners, and the expression, as Mr. Sharp has justly remarked, is highly ridiculous, as no kind of sewing is concerned with the method. The proper plan of dressing wounds with adhesive plaster, is detailed in describing the treatment of incised wounds. (See *Wounds*.) Besides the common way of using strips of sticking plaster, some surgeons have been partial to little particularities. M. Petit used adhesive plasters, which had in the middle, one, or two holes, or even more, according to the extent of the wound. Such openings enabled the surgeon not only to see, whether the edges of the wound were in accurate contact, but also in what state they were; and the apertures afforded an opportunity for applying to the wound such remedies, as were deemed expedient. However, as when common strips of adhesive plaster are properly applied, there should generally be left a certain uncovered interspace, between every two, Petit's plan had no particular advantage in this respect.

Another method was to take two pieces of adhesive plaster, of a breadth and length proportioned to the extent and depth of the wound. Three, or four ligatures, or tapes, were then fastened to one of the edges of each piece of plaster. Both pieces were then warmed, and put on the skin, along the sides of the wound. Then the edges of the cut were evenly brought into contact, and held so by an assistant, until the surgeons confined them permanently in this position, by tying each two corresponding ligatures, or tapes. A pledget was next applied over the wound, and a longitudinal compress over each plaster. Over these, a large square compress was put, and the whole of the dressings were covered, and supported with a bandage. The following day, it was usual to inspect the wound, and if the ligatures seemed lax, they were tightened; but, if in a proper condition, they were not meddled with. Sometimes, when much inflammation and swelling had come

on, the ligatures were loosened; and, when these symptoms had abated, the ligatures were tightened again, if necessary.

REMARKS ON THE EMPLOYMENT OF SUTURES.

Sutures, by which I mean such as were made with a needle and ligature, were much more frequently employed by the old surgeons, than they are by the moderns. All the best practitioners of the present day, never resort to this method of holding the sides of a wound in contact, except in cases, in which there is a real necessity for it, and other modes will not suffice.

There were, indeed, certain instances, in which the employment of sutures was long ago forbidden. Of this kind were envenomed wounds, in which accidents, the destruction of the poison always formed a principal indication in the treatment.—Wounds, accompanied with considerable inflammation, were not deemed proper for the use of sutures, as the stitches had a tendency to increase the inflammatory symptoms. Also, as contused wounds necessarily suppurated, and, consequently, could not be united, sutures were not recommended for them; nor were they judged expedient for wounds, attended with such a loss of substance, as prevented their lips from being placed in apposition. Wounds, penetrating the chest, were not united by sutures; nor were those, in which large blood-vessels were injured; at least, until all danger of hemorrhage was removed by such vessels being tied.

Dionis believed, with several other authors, that wounds should not be united, when bones were exposed, on account of the exfoliations, which might be expected. This precept is no longer valid; for, when bones are neither altered, nor diseased, and are only simply denuded, or divided with a cutting instrument, no exfoliations will commonly follow, if the surgeon take care to replace the fresh cut soft parts, so as to cover the exposed portion of the bone. The practicableness of uniting wounds, attended with the division of a bone, is confirmed, by numerous facts. M. de la Peyronie communicated to the Academy of Surgery, in France, a case, which is very conclusive on this point. A man was wounded with a cutting instrument, in an oblique direction, on the external and middle part of the arm. The bone was completely cut through, together with the integuments and muscles; in such a manner, that the arm only hung by an undivided portion of the skin, about an inch wide, under which were the large vessels. M. de la Peyronie tried to unite the parts, being convinced, that it would be time enough to amputate afterwards, if the case should require it. Hé placed the two extremities of the divided bone in their natural situation; made several sutures for promoting the union of the soft parts; and applied a bandage to the fracture. In this bandage, there were slits, or apertures, over the wound, to allow the dressings to be applied. Spirit of wine, containing a little sal ammoniac, was used as a topical application, and the fore-arm, and hand, which were cold, livid, and insensible, were also fomented with the same. By these means, the natural warmth was restored, and the wound was dressed. In a week, the dressings were removed, through the opening in the bandage; in a fortnight, they were changed, a second time, and the wound seemed disposed to heal. On the eighteenth day, the healing had made progress; the part had a natural appearance; and the beating of the pulse was very perceptible. M. de la Peyronie now substituted a common roller, for the preceding kind of bandage. Care was taken to change the dressings, every ten days. In about seven weeks, all applications were left off, and, at the end of two months, the patient was quite well, with the exception of a little numbness in the part. This case is one of the most important in all the records of surgery; for, it displays, in a most striking manner, what very bad wounds it is the duty of the surgeon to attempt to unite; and, above all, it shews the propriety of attempting to save many compound fractures, which, judged of only from first appearances, would lead almost any one to resort to amputation. When the divided parts, in such cases, have been put into contact, the appearances are quite altered.

From what has been already stated, it appears, that surgeons, a considerable time back, did not at once sew up every sort of wound. The best modern practitioners employ sutures much less frequently, than their predecessors. M. Pibrac's dissertation on the abuse of sutures, inserted in the third volume of the Memoirs of the Academy of Surgery, has had considerable effect in producing this change, and I may safely add, this improvement in practice. This judicious, and enlightened practitioner opposed the method of uniting wounds by means of sutures, which, he contended, ought never to be adopted in practice, except in certain cases, in which it was absolutely impossible to keep the sides of the wound in contact, by the adoption of a proper posture, and the aid of a methodical bandage. Such circumstances M. Pibrac re-

presents, as exceedingly rare, if they can occur at all. He speaks of sutures, as very seldom fulfilling the intention of the surgeon, who, in the majority of cases, in which he employs them, finds himself necessitated to remove them, before they have accomplished the wished-for end. M. Pibrac believes, that sutures are generally more hurtful to, than promotive of, the union of wounds; and, that when they succeed, they do not effect a cure more speedily, than a proper bandage. He cites numerous cases of very extensive wounds of the abdomen, neck, &c. for the cure of which a bandage proved effectual, and this even in many instances, in which sutures had previously failed, and cut their way through the flesh. M. Louis adopted the opinions of M. Pibrac, and published, in the fourth volume of *Mem. de l'Acad de Chirurgie*, a dissertation, in which he endeavours to shew, that the hare-lip can be better united, by means of the uniting bandage, than when sutures are used for the purpose.

As far as I can judge, the fair statement of the matter is, that sutures are, by no means, requisite in the generality of wounds; but, that there are particular cases, in which, either their greater convenience, or superior efficacy, still makes them approved, and employed, by all the most eminent practitioners of the present day. Since sutures cannot be practised, without making additional wounds, and occasioning pain, and since the ligatures always act as extraneous bodies in the parts, in which they are introduced, exciting more or less inflammation, and suppuration round them; there can be no doubt, that their employment is invariably wrong, whenever the sides of a wound can be maintained in contact by means less irritating. For, what is it which generally counteracts the wishes of the surgeon in such cases, and makes his attempts, to make the opposite surface of wounds grow together, prove unavailing? Is not the general cause too high a degree of inflammation, which necessarily ends in suppuration? Are not sutures means exceedingly likely to augment inflammation, both by the additional wounds of the needles, and the still more pernicious irritation of the threads, which always act as foreign bodies, sometimes producing not merely an increase of inflammation, and suppuration in their track; but, frequently, such ulceration as enables them to cut their way out, or else sloughing of the parts; or, in particular constitutions, a very extensive erysipelatous redness round the wound.

By the ulcerative process, just mentioned, sutures very often cease to have the power of any longer keeping the edges of wounds in contact; as the observations of M. Pibrac, and, indeed, what every man may daily remark in practice, fully testify. The violent inflammatory symptoms, which they excite, frequently obliges the surgeon to cut them, and withdraw them altogether.

But, even admitting, that, in the general adoption of sutures, some wounds would be united, which would not be so, were this means of accomplishing an union (generally speaking) abandoned, still it must be allowed, on the other hand, that the cause of some wounds not uniting, is entirely ascribable to the irritation, occasioned by the sutures themselves. Hence, if it be only computed, that as many wounds are prevented from uniting by the irritation of sutures, as other wounds, which are united by their means, and could be united by no other methods, we must perceive, that mankind would be no sufferers, and surgery undergo no deterioration, were sutures altogether rejected from practice. I believe, however, that every man, who has had opportunities of observation, and has made use of them, with an unprejudiced mind, will feel persuaded, that more wounds are hindered from uniting by sutures, than such as are healed by them, and, *could not be united by other* means.

But, prudent practitioners are not obliged, either to condemn or praise, the use of sutures, in every instance, without exception. Men of independent principles will always adopt the line of conduct, which truth points out to them as that which is right; nor will they obstinately side with M. Pibrac and M. Louis, in contending that sutures are always improper and disadvantageous, nor, with other bigoted persons, who may use sutures in every kind of wound whatever.

Sutures are, perhaps, still rather too much employed, and in all probability, will long be so. It will be difficult entirely to eradicate the prejudices, on which their too frequent use is founded, as long as we see, what may be called, the *Maîtres de l'Art*, holding up the practice for imitation, in every principal hospital in the kingdom. Such surgeons, however, as are ready to imbibe fair and candid sentiments on the subject, and to qualify themselves for practising this part of surgery, with judgment, should by no means, neglect to read, both what M. Pibrac and M. Louis, have written on the subject. I know, that the latter authors are a little too sanguine, in their representations; but, as I have already remarked, sutures are still rather too much used, and something is yet necessary to do away a certain unwarranted habit of having recourse to them in several particular cases. Nothing

will tend to produce this desirable change so much, as the perusal of every argument against the employment of sutures.

I am decidedly of opinion, not from what I have read, but what I have actually seen, that the sides of the generality of wounds are capable of being effectually kept in contact, by means of a proper position of the part, the aid of strips of adhesive plaster, and that of compresses, and bandages. I believe, that such success can be obtained, with every advantage, which can be urged in favour of sutures, and without their disadvantages; such as greater pain, inflammation, &c. I even think, with M. Louis, that the hare-lip could in general be united very well, by means of a bandage; but, still, I am of opinion, that the twisted suture is attended with least trouble, is most suited for universal practice, and, that, unless such pains were taken, as many practitioners would not, and others could never take, the method by bandage would frequently fail.

I find it exceedingly difficult to lay down any fixed principles for the guidance of the surgeon, in respect to when he ought, and when he ought not, to use sutures.

Perhaps, sutures, should be made use of, for all cuts and wounds, which occur in parts, which are subject to an unusual degree of motion, such as would be apt to derange the operation of bandages, sticking plaster, and compresses. Hence, the propriety of using the twisted suture for the hare-lip.

Sutures are probably, for the most part, advantageous, in all wounds of the abdomen, of a certain length, and attended with hazard of the viscera making a protrusion. In this situation, the continual motion and action of the abdominal muscles, in carrying on respiration, besides the tendency of the viscera to protrude, may be a reason in favour of the use of sutures.

When two fresh-cut surfaces positively cannot be brought into contact, by sticking plaster, bandages, the observance of a proper posture, &c. there can be no doubt of the advantage of using sutures, if they will answer the purpose. Some wounds of the trachea; some wounds made for the cure of certain fistulous communications between the vagina and bladder; or others for the cure of similar affections in the perinæum; afford instances of cases, to which I allude.

I observe, that many of the best operators in this metropolis, use sutures for bringing the sides of the wound together after several operations; such as that of removing a diseased breast; castration; and operations for strangulated hernia. The reason for using sutures in the scrotum, I suppose, arises from the difficulty of keeping the edges of the wound in contact, owing to the great quantity, and looseness of the part. I cannot pretend to determine, whether, in this case, sutures are really necessary, or not: but, after the amputation of the breast, I have no hesitation, in pronouncing their employment wrong and injudicious.

I shall conclude with referring to what M. Pibrac and M. Louis have written on the above subjects, in *Mem. de. l'Acad. de Chir. tom.* 3 & 4. *Sharp, Dionis, Gooch, Le Dran, Bertrandi, Sabatier, B. Bell, and J. Bell, have all treated of sutures.*

SYCOMA. (from συκη, a fig.) A wart, or excrescence, resembling a fig.

SYCOSIS. The same.

SYMPATHETIC BUBO. (See *Bubo.*)

SYNCHYSIS. (from συγχυω, to confound.) Saint-Yves, and Maitre-Jan, signify by this term a conversion of the vitreous and crystalline humours of the eye into a viscid, purulent matter, which, in the course of time, assumes the appearance of a yellowish serum. Since the time of the preceding oculists, the term *synchysis* has been used to denote the confusion of the humours of the eye, occasioned by blows, and attended with a rupture of the internal membranes, and capsules. (See *Encyclopédie Méthodique; Part. Chir. Art. Synchyse.*)

SYNCOPE. (from συγκοπτω, to cut down.) A sudden prostration of the vital powers; a fainting fit.

SYNOVIA. (a term of no radical meaning, and invented by Paracelsus.) The fluid, secreted in joints, for the purpose of lubricating the articular surfaces.

SYNTASIS. (from συντεινω, to extend.) A distention of parts by swelling.

SYNTHESIS. (from συν, together, and θεσις, position, situation.) A generic term, formerly much used in the schools of surgery, and comprehending every operation, by which parts, which had been divided, were reunited.

SYNTHETISMUS. (from συνθεω, to concur.) The reduction of a fracture.

SYNULOTICA. (from συνουλοω, to cicatrise.) Medicines, or applications, which promote the cicatrization of wounds.

SYPHILIS. (is fabulously said to be derived from the name of a shepherd, who fed the flocks of King Alcinous, and who from pride insulted the Sun, whence the disease was sent on earth as a punishment.) Lues Venerea. The venereal disease; others write *Siphilis*, and derive the term from σιφλος, filthy. (See *Venereal Disease.*)

SYRINGOTOMUM. (from συριγξ, a fistula, and τεμνω, to cut.) A kind of

concealed knife, for dividing fistulæ, and sinuses. Figures of it may be seen in Scultetus, and Fabricius ab Aquapendente. It was constructed in various ways; but, as it is not at present employed by surgeons, it would be a waste of time to introduce a description of its different forms.

SYSTOLE. (from *συστελλω*, to contract.) The contractile motion of the heart and arteries.

T

T BANDAGE. A bandage, so named from its figure. It is principally used for supporting the dressings after the operation for the fistula in ano, in diseases of the perinæum, and those of the groins, anus, &c. It is composed of two longitudinal pieces of cloth, of greater, or lesser breadth, according as occasion requires. The transverse piece of cloth serves to go round the body above the hips; the perpendicular piece is sewed, at one of its ends, to the middle of the latter; and, in general, its other extremity is slit into two portions, or tails, about six, or eight inches long. The perpendicular piece of the T bandage applies itself between the glutæi muscles, and to the perinæum; while its two ends, just described, are to be carried between the thighs, and the pudenda, to the right and left, and fastened to the transverse piece, surrounding the body. Besides the common T bandage, there is another one named *double*, which has two perpendicular pieces, sewed to the transverse one, about four inches apart. The double T bandage is said to be more particularly applicable after lithotomy, and for the diseases of the perinæum; because, one may make the two perpendicular pieces cross each other on the part affected, and leave the anus uncovered; an advantage, which the simple T bandage certainly has not. The T bandage may be used in some other ways, as we have noticed, in making mention of it in the article *Bandage*.

TABES. (from *tabeo*, to consume.) A wasting of the body, attended with extreme debility and hectic fever.

TALPA. (a mole.) A tumour, which creeps under the skin, as a mole under the surface of the ground. Such is the etymology. It is often applied to an encysted tumour, which forms on the head, and contains a paplike matter. (See *Atheroma* and *Tumours, Encysted.*)

TALPARIA. The same.

TAPPING. See *Paracentesis*.

TARAXIS. (from *ταραττω*, to disturb.) A slight ophthalmy, or inflammation of the eye.

TAXIS. (from *τασσω*, to put in order.) The operation of reducing a hernia with the hand. (See *Hernia.*)

TELEPHIUM. In surgery means a malignant, dangerous ulcer, difficult of cure. The word is derived from Telephus, who received a mortal wound from Achilles, which injury, it is said, became, before death, a disease of the above description.

TENDO ACHILLIS. See *Achilles, Tendon of.*

TENESMUS. (from *τεινω*, to stretch.) A painful, ineffectual, and repeated, effort to go to stool.

TENT. A roll of lint for dilating openings, sinuses, &c. (See *Spongia Præparata.*)

TEREBELLA. (dim. of *terebra*, a perforating instrument.) A trepan, or instrument for sawing out circular portions of the skull. A trephine.

TEREBRA. (from *τειρω*, to bore.) A trepan, or trephine. Also an instrument called a perforator, such as is contained, in the generality of cases of trephining instruments, and is used for making a hole, in which the centre pin of the trephine is to work.

TERETRUM. The same.

TERMINTHUS. (from *τερμινθος*, a pine-nut.) A large tumour, or painful pustule on the skin, resembling a pine-nut.

TESTICLE, DISEASES OF. For an account of many of these affections, I must refer the reader to distinct articles in this Dictionary; for instance, *Cirsocele, Hernia Humoralis, Hæmatocele, Hydrocele*, &c. I shall next insert Mr. Pott's account of *Sarcocele*; but, before I do so, it seems proper to observe, that, when this author uses the epithet *scirrhous*, he frequently seems to attach no other signification to it, than *indurated*. Indeed, any one, in the least acquainted with the subject, would readily discern, that Mr. Pott

could not always mean the *malignant* tumour, or hardness, which is often named the occult cancer.

SARCOCELE.

"This (says Pott,) is a disease of the body of the testicle; and, as the term implies, consists, in general, in such an alteration, made in the structure of it, as produces a resemblance to a hard fleshy substance, instead of that fine, soft, vascular texture, of which it is, in a natural and healthy state, composed,

"The ancient writers have made a great number of distinctions of the different kinds of this disease, according to its different appearances, and according to the mildness or malignity of the symptoms, with which it may chance to be attended. Thus, the sarcocele, the hydro-sarcocele, the scirrhus, the cancer, the caro adnata ad testem, and the caro adnata ad vasa, which are really little more than descriptions of different states and circumstances of the same disease, are reckoned as so many different complaints, requiring a variety of treatment, and deriving their origin from a variety of different humours.

"Every species of sarcocele consists primarily in an enlargement, induration, and obstruction of the vascular part of the testicle; but, this alteration is, in different people, attended with such a variety of circumstances, as to produce several different appearances; and to occasion the many distinctions which have been made.

"If the body of the testicle, though, enlarged and indurated to some degree, be perfectly equal in its surface, void of pain, has no appearance of fluid in its tunica vaginalis, and produces very little uneasiness, except what is occasioned by its mere weight, it is usually called a *simple sarcocele* or an *indolent scirrhus*. If, at the same time that the testis is enlarged and hardened, there be a palpable accumulation of fluid in the vaginal coat, the disease has by many been named a *hydro-sarcocele*. If the lower part of the spermatic vessels and the epididymis were enlarged, hard, and knotty, they supposed it to be a fungous or morbid accretion, and called it the *caro adnata ad vasa*: if the testicle itself was unequal in its surface, but at the same time not painful, they distinguished it by the title of *caro adnata ad testem*: if it was tolerably equal, not very painful, nor frequently so, but at the same time hard, and large, they gave it the appellation of an *occult* or *benign cancer*: if it was ulcerated, subject to frequent acute pain, to hemorrhage, &c. it was known by that of a *malignant* or *confirmed cancer*. These different appearances, though distinguished by different titles, are really no more than so many stages (as it were) of the same kind of disease: and depend a great deal on several accidental circumstances; such as age, habit, manner of living, &c. It is true, that many people pass several years with this disease, under its most favourable appearances, and without encountering any of its worst: but on the other hand, there are many, who, in a very short space of time, run through all its stages. They who are most conversant with it, know how very convertible its mildest symptoms are into its most dreadful ones; and how very short a space of time often intervenes between the one and the other.

"There is hardly any disease, affecting the human body, which is subject to more variety than this is, both with regard to its first manner of appearance, and the changes which it may undergo.

"Sometimes the first appearance is a mere simple enlargement and induration of the body of the testicle; void of pain, without inequality of surface, and producing no uneasiness, nor inconvenience, except what is occasioned by its mere weight. And some few people are so fortunate, as to have it remain in this state for a very considerable length of time, without visible or material alteration. On the other hand, it sometimes happens, that, very soon after its appearance in this mild manner, it suddenly becomes unequal, and knotty, and is attended with very acute pains, darting up to the loins and back; but still remaining entire, that is, not bursting through the integuments. Sometimes the fury of the disease brooks no restraint; but making its way through all the membranes which envelope the testicle, it either produces a large, foul, stinking, phagedenic ulcer with hard edges; or it thursts forth a painful gleeting fungus, subject to frequent hemorrhage.

"Sometimes (as I have already observed) an accumulation of water is made in the tunica vaginalis, producing that mixed appearance, called the hydro-sarcocele.

"Sometimes there is no fluid at all in the cavity of the tunica vaginalis; but the body of the testicle itself is formed into cells, containing either a turbid kind of water, a bloody sanies, or a purulent, fetid matter.

"Sometimes the disorder seems to be merely local, that is, confined to the testicle, not proceeding from a tainted habit, nor accompanied with diseased viscera; the patient having all the general appearances and circumstances of health, and deriving his local mischief from an external injury. At other times, a pallid, leaden countenance, indigestion, frequent nausea, colic pain, sudden purgings, &c.

sufficiently indicate a vitiated habit, and diseased viscera; which diseased viscera may also sometimes be discovered and felt.

"The progress also which it makes from the testis upward, toward the process, is very uncertain; the disease occupying the testicle only, without affecting the spermatic process, in some subjects, for a great length of time; while in others, it totally spoils the testicle very soon; and almost as soon seizes on the spermatic cord.*

"These, and some other circumstances to be mentioned hereafter, are materially necessary to be observed; as they characterise the disease, point out its particular nature and disposition, and serve as marks whereon to found our judgment and prognostic of the most probable event, as well as the most proper method of treatment. Various have been the causes, to which the theoretic and whimsical people have assigned this disease; but as a recital of conjectures can convey no instruction, or useful information, I shall pass them over; and only take notice, that among the great number which have been mentioned, there are two which, though equally groundless with the rest, have yet obtained a degree of credit, that may mislead: these two are the hernia humoralis, and the hydrocele of the vaginal tunic.

"The hernia humoralis (continues Pott) is a defluxion of the inflammatory kind, proceeding most frequently from an irritation in that part of the urethra, where the vasa deferentia, or vesiculæ seminales terminate†. It is attended with pain and heat, and most frequently fever: during the first, or inflamed state of the disease, the whole compages of the testicle is enlarged; but when by rest, evacuation, and proper applications, that inflammation is calmed, there seldom or never remains, either fulness, hardness, or any other mark of disease in the glandular part of the testis. The epididymis indeed seldom escapes so well; that often continues enlarged and indurated for a considerable space of time, but without producing either pain or inconvenience; and without occasioning any alteration in the figure or structure of what is called the body of the testicle; whereas the true sarcocele, or hernia carnosa, most commonly* begins by an indolent induration of that part of the testis, and affects the epididymis secondarily; or after it has already spoiled the vascular part of the gland.

"I would not be understood to mean, (says Pott) that a sarcocele never follows a hernia humoralis; there is no reason in nature why it should not: a hernia humoralis does not, nor can prevent the testicle, in any future time, from becoming scirrhous: I only say, that it does not, at any time, necessarily cause or produce it. So also with regard to the epididymis, I do not mean to say, that it never is the primary and original seat of a scirrhus: I know that it is, and shall produce some instances of it; neither do I intend to say, that a scirrhus never attacks an epididymis, which has been previously hardened by a hernia humoralis; there can be no reason why it should not: I only mean to signify, that it is my opinion, that the induration caused by a venereal hernia humoralis does not, at any time, necessarily produce a scirrhus. A scirrhus indeed may fall on that part, after it has been so diseased; but it would as certainly have attacked it, if there had been no preceding affection of it.

"There is also a venereal affection of the testicle, independent of a gonorrhea, or of any disease of the urethra.

"This is seldom an early symptom; and I do not remember (observes Pott) ever to have seen an instance, in which it was not either immediately preceded, or accompanied, by some other appearance, plainly venereal. It has neither the inequality, nor darting pains of the scirrhus, and always gives way to a mercurial process properly conducted.

"A quantity of water is frequently collected in the vaginal coat of a truly scirrhous testis. This has given rise to the supposition, that the testicle often becomes diseased, from its being surrounded by, or swimming in the same fluid: a supposition entirely groundless.

"That scirrhous and cancerous testes very frequently are found to have a quantity of fluid accumulated in the tunica vaginalis of them, is beyond all doubt; but

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* This is the common language, and therefore I use it; but I would not be understood to mean, that the progress of the disease is always and invariably upward, from the testis into the process. I have seen the spermatic process truly cancerous, when the testicle has been free from disease; and am well satisfied from experience, that a diseased state of the vessels within the abdomen, or of the parts in connexion with those vessels, may produce a morbid state of the process, proceeding downwards from thence: but the other is by much the most frequent.—(*Pott.*)

† This may be doubted.—*S. C.*

* I say most commonly, because it is neither necessarily, nor always.

that such testicles become diseased, in consequence of being surrounded by such fluid, or, in other words, that a simple hydrocele may produce a scirrhous testicle, is by no means true.

"The simple hydrocele is a collection of water in the tunica vaginalis: this fluid, in a natural and healthy state of the parts, is small in quantity, and, by being constantly absorbed, does not distend the cavity of the tunic, but only serves to keep that membrane from contracting any unnatural cohesion with the tunica albuginea. The regular absorption of this fluid being by some means prevented, the quantity soon becomes considerable, and distending its containing bag, constitutes the disease called a hydrocele; but makes no morbid alteration in the structure of the testicle*. (See *Hydrocele*.)

"When the testicle becomes enlarged in size, hardened in texture, craggy and unequal in its surface, painful upon or after having been handled, attended with irregular pains shooting up the groin toward the back, and this without any previous inflammation, disease, or injury from external violence, it is said to be affected with a scirrhus. This, as I have already remarked, is of different kinds and degrees, and appears under different forms; but, although the appearances, which the disease makes, are various, according to the alteration produced by it in the testicle; yet, every such morbid alteration may obstruct or prevent the regular absorption of the fluid deposited in the vaginal tunic, and occasion a species of hydrocele; that is, a tumour from water.

"This is that kind of disease, which, by Fabricius ab Aquapendente, is called hydro-sarcocele; but which is so very unlike to a simple hydrocele, that whoever mistakes the one for the other, will commit an error, which may prove very mischievous to his patient, and very detrimental to himself.

"In the true, simple hydrocele, the testis, though somewhat loosened in its texture, and a little enlarged, yet preserves very nearly its natural form; the collection is made without pain or uneasiness, and very soon becomes sufficient to hide, or conceal, the testicle; nor is the examination of such tumour attended with any pain: but the increased size, and hardened state, of the scirrhous testis, renders it discoverable, through a much larger quantity of fluid than will totally conceal the former. When felt, it will be found to be hard, and generally somewhat unequal, and not unfrequently attended with irregular shooting pains, especially after having been examined.

"In the simple hydrocele, the fluid distends the tunica vaginalis so equally, that, although it does not surround the testicle, (nor indeed can) yet it seems so to do: whereas in the hydro-sarcocele, though the anterior part of the tumour may, in some measure, bear the appearance of a simple hydrocele; yet, an examination of its posterior part will always discover the true nature of the case: to which may be added, that, under the same apparent magnitude, the latter will always be found to be considerably heavier than the former.

"In short, the name of this species of disease (hydro-sarcocele) is undoubtedly a very proper one, and capable of conveying a very just idea of its true nature, viz. an accumulation or collection of water in the vaginal coat of a scirrhous or diseased testicle; but the majority of writers have, by supposing the water to be the cause, instead of the consequence of the diseased state of the testis, committed a very material blunder, and endeavoured to establish and authorise a very prejudicial and destructive method of practice. For, by conceiving, that the noxious quality of the fluid produces a fungous or fleshy excrescence on the surface of the testicle, they have supposed, that, after having discharged the said fluid from its containing bag, they could, either by establishing a suppuration, or by using escharotic medicines, waste or destroy the said excrescence, and obtain a radical cure of the whole disease. Now the scirrhosity of the testicle being the original disease, and the extravasation a mere accident, such treatment can never do any material good, and may often be the cause of very essential evil.

"Fabricius ab Aquapendente has given a particular description of this method, which he recommends from having practised it with success: his words are; '*Modus singularis est quando hernia aquosa cum carnosâ mista est; tunc enim primum incide, et fac foramen in parte scroti quæ non sit declivis, neque in fundo scroti, sed circa medium; nec fac admodùm latum: et extractâ aquâ, turundam impone quàm longissimam, medicamento, pus moventi infectam, ut resina terebinthinæ, cum thure, ovi vitello, et butyro; emplastrum emolliens, et pus movens applica, ut diachylon cum gummis, et axungiâ porci: genitum autem pus, non evacuetur per foramen, sed datâ operâ intus servetur, ut contactu suo, carnem sensim*

* That is, no such alteration as renders it painful, or incapable of executing its office; and consequently, no such alteration as can ever require extirpation or any other chirurgical operation on the testicle itself.

putrefaciat. Neque innovanda medicamenta, nisi tota caro fuerit in pus conversa ; id quod longo fit tempore." *

"Now, to pass over the absurdity of the doctrine of removing or dissolving a fungous excrescence, by means of the putrefying quality of matter: as well as the great disturbance, which must be the consequence of confining it within the tunica vaginalis; it is very clear from these, and from every other circumstance attending the disease in question, that the cases, which Fabricius had successfully made his experiment upon, must have been mere simple hydroceles, attended with a small degree of enlargement; but without any diseased state of the testicle.

"This is one method of procuring a radical cure of the said disease: a method in use, before Fabricius practised it; and still in some measure employed: a method, which, in some instances, has always been successful; and which may, in general, be tried on any simple hydrocele, in a young and healthy subject. The cure (when it affects one) is not brought about by the destruction of an excrescence from the testicle, or the dissolution of its supposed induration; but merely by exciting such an inflammation, as shall occasion an adhesion of the tunica vaginalis to the tunica albuginea; by which means the cavity of the former is obliterated; the testicle remaining, as to size and consistence, just as it was before such operation was performed. But this, though practicable, and sometimes successful in the hydrocele, is not to be thought of in the diseased or scirrhous testicle. The operation, as described by Aquapendente, consists of two points; first to let out the water, and then to cause a plentiful suppuration. When the testicle is really and primarily diseased, and the extravasation is a consequence of such disease, the discharge of the water from the cavity of the tunica vaginalis, whether by puncture, or by incision, can contribute nothing material toward a cure of the principal complaint, and is therefore useless; but it may, in many cases, do harm, by creating a disturbance in parts, whose state requires the most perfect quietude; and is therefore wrong. When the disease is a mere simple hydrocele, the palliative cure, as it is called, by puncture, is right and necessary; it renders the life of the patient easy; rids him, every now and then, of a very troublesome burden; is perfectly safe; may be performed and repeated occasionally, at any time of the patient's life, or in almost any state of the disease: but the introduction of tents or setons, or the endeavour by any means to excite inflammation, or to establish suppuration within the tunica vaginalis, requires (even in the simple hydrocele, where the testicle is unaffected) some little consideration, and ought not to be hastily or unadvisedly put in practice.

"In some ages, habits, &c. the symptoms will rise very high, and occasion both trouble and hazard: and if this be the case, when the testis is not at all diseased, and when there is no malignity, either in the local complaint, or in the habit of the patient; what have we not to fear where there is both? where the parts are already spoiled by disease, and where irritation and inflammation may (and do) excite the most fatiguing symptoms, and the most direful consequences?

"Beside the hydro-sarcocele, or limpid extravasation of fluid, in the cavity of the vaginal coat (and which must therefore always be external to the testicle) scirrhous and cancerous testes are liable to collections of fluid, within the substance of them, under the tunica albuginea. These are sometimes large, and in one cavity; sometimes small, and in several distinct ones. They are also very different in nature, in different cases; sometimes serous, sometimes sanious; sometimes purulent, sometimes bloody. These are very apt to impose on the inadvertent and injudicious; (especially if they be attended with some degree of inflammation in the skin;) and to induce an opinion of an abscess, or imposthumation, which may be relieved or cured by an opening;—but *caveat operator*. These collections will be found to bear a much smaller proportion to the general size of the tumour, than they who are not conversant with them are inclined to apprehend; the subsidence, after the opening has been made, will also be much smaller than was expected; and, instead of relief and ease, all the symptoms of pain, swelling, inflammation, &c. will be increased and aggravated: and if the opening be considerable, it not unfrequently happens, that an ill-natured fungus is thrust forth; which, by bleeding, gleeting, and being horribly painful, disappoints the surgeon, and renders the state of the patient much more deplorable than it was before: neither is this sensation, which is thought, like the fluctuation of

* "Si carnosa, et aquosa sit hernia, ego talem adhibeo curam: Seco cutem, et incisionem facio exiguam, et in loco potiùs altiore, quàm in fundo: inde turunda imposita cum digestivo et pus movente medicamento diutius procedo, neque unquam pus extraho, sed perpetuò bonam partem intus relinquo; quod sensim carnem corrodit, et ita sanat."

a fluid within the testicle, to be at all times depended upon as implying that there is any fluid at all there. The touch, in this case, is subject to great deception; and I have seen a loosened texture of the whole vascular structure, or body of the testicle, produce a sensation so like to the fluctuation of a fluid lying deep, as has imposed on persons of good judgment, and great caution.

"Many of the most esteemed writers on this part of surgery, either not being practitioners, or being afraid to differ from those who have written before them, have lazily and servilely copied each other, and have thereby fallen into an obscure jargon concerning this disease, which neither themselves nor their readers have understood. They have talked of the scirrhous testicle, the caro adnata ad testem, and the caro adnata ad spermatica vasa, as so many different diseases, requiring different methods of treatment.

"The melancholia, the atra bilis, and a certain inexplicable adust state of humours, are said to be the causes of these different appearances; and the fleshy substance arising from, or adhering to, the spermatic vessels, is said to be more benign, than either the fungus arising from the testicle, or the true scirrhus. For the first, they have described an operation, which is coarse, cruel, painful, and (notwithstanding all that they have said about it) unsuccessful; all which they must have known, if they had *practised* it. I therefore am much inclined to believe, that this is one of the many parts of ancient surgery, which having been devised by some one bold, hardy operator, and by him described as practicable, has been related by many of his successors, as practised. The second, the caro adnata ad testem, they allow to be attended with more difficulty, as well as hazard, and seldom to be attended with success.

"They, who are under the necessity of forming their opinions principally from books, and who have not frequent opportunities of knowing from experience how very little they are (in many cases) to be depended upon, may be inclined to think, that all these distinctions really exist; and that these operations by fire and sword, by knives and cauteries, so exactly described, must be sometimes necessary; but having never seen the particular cases requiring such treatment, have a very imperfect idea, either of them, or of the operations; and are, to the last degree, alarmed and intimidated, when any thing, which they think is like to it, occurs to them in practice. To such, it may not be amiss to explain this matter, in as few words as I can; begging pardon of the more intelligent reader for the digression.

"In the short anatomical account which I have given of these parts, I have taken no notice, that the spermatic vessels terminate in the testicle: and that, after the semen has been secreted from the blood, it passes from that gland into a body, which seems superadded to, although it be really continuous with it. This body is therefore called the epididymis, and is so placed, with regard to the testis, that a heedless or uninformed observer may suppose, that the spermatic vessels terminate in it; especially if it be enlarged by disease. It takes its rise from the testicle, by a number of vessels, called, from their office, vasa efferentia: these soon become one tube, which, being convoluted and contorted in a most wonderful manner, forms the greater part of the said body: and at last, ceasing to be so convoluted, it ends in one firm canal, called the vas deferens; by which, the secreted semen is conveyed from the testicle to the vesiculæ seminales.

"Whoever will attentively consider the epididymis in its natural position, with regard to the testicle and the spermatic vessels, will see, that if it be enlarged beyond its proper size, it will extend itself upward, in such a manner as to seem to be closely connected with them, and to bear the resemblance of a diseased body, springing from them.

"This is the case called the caro adnata ad vasa spermatica; and is really and truly nothing more, than an enlargement of the epididymis; a circumstance which occurs not infrequently, but does not imply any malignity, either in the part, or in the patient's habit; and can never require such a horrid operation as our forefathers have directed us to perform upon it; nor indeed any at all.

"The epididymis is frequently enlarged, in venereal cases, either separately, as in the remains of a hernia humoralis, or together with the testicle, in that affection of it, which I have called the venereal sarcocele; and sometimes from mere relaxation of its natural texture, without any disease at all. But in none of these can it require, or even admit any manual operation of any kind. Indeed, whoever will consider the epididymis as it really is, as the medium by and through which the semen is conveyed from the testicle to the vas deferens, must immediately be sensible of the glaring absurdity of removing any part of it.

"The scirrhus and cancer do not very often begin in this part; they most frequently make the first attack on the body of the testis: and, though the epididymis is often cancerous, yet it most frequently becomes so secondarily, or after the testicle is spoiled; so that the removal of it, if practicable, could serve no good pur-

pose: it would not remove the disease; for that has, before-hand, most commonly taken possession of the testicle; and the cutting off any part of a scirrhous or cancerous tumour of any kind, is what no man, who has the least knowledge of what he is about, will ever think of.

"In short, these two cases, which by the inattention and misrepresentation of our ancestors, have created such perplexity in the minds of their readers, are either a simple enlargement of the epididymis, without any morbid alteration in its structure; or a diseased (that is, a scirrhous) state of the same part; or else, a scirrhous or cancerous testicle, with inequality of surface. The first of these requires no manual operation of any kind; and the two last will admit of none: the first is no disease at all; and the two last are such diseases, that every attempt made on them, by knife or caustic, (unless for total extirpation) must render them worse, and more intractable.

"The manner of treating a sarcocele, or hernia carnosa, depends entirely on the particular nature and state of each individual case. In some, it will admit of palliation only; in others, the disease may be eradicated by the extirpation of the part: so that, under the article of method of cure, we have only to consider, and point out, as clearly as the nature of the disease will permit, what states and circumstances, both of it, and of the patient labouring under it, forbid the operation, and what render it advisable.

"On this head, a great variety of opinions will be found among writers; so great, that a man, who is under a necessity of forming his judgment from them, will find himself under some difficulty how to act; and so great, that I cannot help thinking it to be clear, that the majority have not written from practice, but from mere conjecture, or from the works of those, who have gone before them.

"Some have given it as their opinion, that while the testicle is perfectly indolent, (let the alteration in its structure, form, or consistence, be what it may,) it is better to suffer it to remain, than to remove it. In support of this opinion, they say, that although the disease has plainly taken possession of the part, yet, while it causes no pain, the constitution receives no damage from it; nor is the health of the patient impaired by it; whereas, by removing the testicle, the same virus may seize on some part of more consequence to life. This method of reasoning takes for granted two things, which do not appear to be strictly or constantly true, viz. that this disease is never perfectly local; and that a scirrhous testicle, though free from pain, will not in time produce any evil to the general habit of the patient. Others advise us to stay until the tumour becomes painful, and manifestly increases in size, or acquires a sensible inequality of surface? that is (in other words) until it begins to alter from a quiet state, to a malign one: which advice, as well as the preceding, supposes, that the hazard of the mere operation of castration is too great to render it an advisable thing, until the patient is pressed by bad symptoms; and that a scirrhous testicle, which has been quiet and free from pain for some time, may be as successfully extirpated after it has become painful, and has acquired a malignant and threatening state, as at any time before such alteration. The latter of these will hardly be admitted (I believe) by those, who form their opinions from experience: and with regard to the former, I can, with great truth, affirm, that I never saw the mere operation of castration, when performed in time, and on a proper subject, prove fatal.

"Many people have I known, who have lived several years, their whole lives perfectly free from disease, after the removal of quiet, indolent, scirrhous testicles; and several have I known, who, having deferred the operation until they were urged by pain, increase of size, and inequality of the tumour, have, from the sore becoming cancerous, not been able to obtain a cure. That I have seen the same thing happen, after the removal of a testicle, circumstanced in the best manner, is beyond all doubt; but not near so frequently, as in those cases, in which the operation has been deferred, until the symptoms became alarming, and the disease had changed its appearance, from a benign quiet one, to one that was malign and painful. Indeed, were we capable of knowing with certainty which those scirrhi were, that would remain quiet and inoffensive through life, or for a great length of time, and which would not, we should then be enabled to advise or dissuade the operation upon much better (that is, much surer) grounds, than at present we are able to do. We have no such degree of knowledge; all our judgment is formed upon the mere recollection of what has happened to others in nearly similar circumstances; and experience, though the best general guide, is, in these cases, more fallacious than in many others.

"A few people there certainly have been, who have been so fortunate as to carry a scirrhous testicle through many years, with little or no pain or trouble: but the number of those, in whom time (and that frequently a short space), change of constitution, external accidental injury, &c. do not make such an alteration in this disease, as to render the

operation less likely to be successful, than it would have been at first, and under more favourable circumstances, is so small, that I think early castration (that is, as soon as the disease is fairly formed and characterised) may be recommended and practised by every honest and judicious surgeon.

"Indeed, the circumstances of frequent pain, and a manifest tendency to an increase of size, are by some people looked on as such marks of a malignant disposition, that they have been by them reckoned as dissuasives from the operation.

"But these gentlemen carry their fears and apprehensions much too far the other way. Pain and a quick increase of size are certainly no favourable symptoms; they shew a disposition to mischief; but, they are not such positive proofs of a cancerous habit, as to render all hope of a cure, from the removal of the diseased part, vain: there are many instances to the contrary: and though no honest or judicious man will venture to promise success, even in the most favourable of these cases, yet it is well known, that they which have had very unpromising appearances, not only from the state of the testicle, but from that of the spermatic chord, have succeeded often enough, to make the chance of a cure, by the operation, by no means a desperate one. The state of a man left to his fate in these circumstances, that is, to the fury and progress of the disease, is so truly miserable, that nothing should be left unattempted, which carries with it any probability of being serviceable: and a practitioner is vindicable, in pressing what he has known to be successful; though, at the same time, he ought to make a guarded kind of prognostic.

"Upon the whole, I think it may justly be said, that the man who has the misfortune to be afflicted with a truly scirrhous testicle, has very little chance (notwithstanding all that has been said and written about specifics) to get rid of it by any means, but by extirpation: and all the time the operation is deferred, he carries about him a part not only useless and burthensome, but which is every day liable, from many circumstances (both external and internal) to become worse, and more unfit for such operation.

"While the testicle is small, and free from acute or frequent pain, the vessels from which it is dependent, are most frequently soft, and free from disease; whereas, when the testis has been suffered to attain a considerable size, the case is frequently otherwise; the spermatic vessels are often large and varicose; and the cellular membrane investing them sometimes becomes thick, and contracts such connexions and adhesions, which, though they may not amount to an absolute prohibition of the operation, do yet render it tedious, troublesome, and more hazardous than it would be in other circumstances. Every addition to the original complaint in the body of the gland is against the patient; and if any of these are the consequence of not having removed it in time, it will follow, that the sooner it is removed, the better. If we wait for what some call indications of the necessity of operating, we shall often stay until it will do no good. Many a one have I seen lose a very probable chance of a cure by delay: but I do not remember ever to have seen a testicle removed, by a man of judgment, which testicle did not, upon examination, fully vindicate the extirpation. If we were possessed of any medicines, either external or internal, which had been known now and then to have dissolved scirrhi, it would always be right to recommend the trial of them previous to an operation; and it would always be right to defer operating until such trial had been made. But the truth is, we know no such medicine. The credulous on the one hand, and the designing on the other, have told us many strange stories of cures effected by such applications and remedies; and I do most sincerely wish, that what each of them have said was true: but repeated, faithful experience has proved, that it is not; and that they who gave placed their confidence in them, or laid out their money on them, have been disappointed and cheated.

"Some circumstances there are now and then attending this disease, which are out of our sight and out of our knowledge, and which will render all our pains abortive: such are tubercles, indurations, and other diseased appearances, in the cellular membrane enveloping the spermatic vessels within the abdomen; scirrhous viscera, &c. If any of these can be known, they constitute a good reason for not attempting the cure by the operation; but the mere possibility that such may exist, is certainly no reason for abstaining from it: the apparent evil, that is, the diseased testis, is certain; the other may or may not be the case: the one, if left to itself, is most likely to destroy the patient in a most miserable and tedious manner; and the other, the suspected mischief, may possibly not exist.

"But though the timely and proper removal of a scirrhous or cancerous testicle does frequently secure to the patient life, health, and ease, which, in such circumstances, are not attainable by any other means; yet it must be remarked, that the improper and untimely performance of the operation is not only not attended with such happy and salutary event, but generally brings on high symptoms, and

quick destruction. It therefore behoves every practitioner to be perfectly well acquainted, not only with such circumstances as render castration practicable and advisable, but with those which prohibit such attempt.

"These are of two kinds, and relate either to the general habit of the patient, and the disorders and indispositions of some of the viscera, or to the state of the testicle, and spermatic chord.

"A pale, sallow complexion, in those who used to look otherwise; a wan countenance, and loss of appetite and flesh, without any acute disorder; a fever of the hectic kind; and frequent pain in the back and bowels, are, in those who are afflicted with a scirrhous testicle, such circumstances as would induce a suspicion of some latent mischief, and incline one to suppose that the same kind of virus, which had apparently spoiled the testis, may also have exerted its malign influence on some of the viscera; in which case, success from the mere removal of the testicle is not to be expected. They, whose constitutions are spoiled by debauchery and intemperance, previous to their being attacked with this disease; who have hard livers, and anasarcous limbs, are not proper subjects for such an operation. Hard tumours within the abdomen in the regions of the liver, spleen, kidneys, or mesentery, implying a diseased state of the said viscera, are very material objections to the removal of the local evil in the scrotum. In short, whenever there are manifest appearances, or symptoms of a truly diseased state of any of the principal viscera, the success of the operation becomes very doubtful; more especially, if such symptoms and appearances, upon being properly treated, resist in such manner, as to make it most probable, that a cancerous virus is the real cause of them. When none of these require our attention, the object of consideration is the testicle and its spermatic vessels. The state of the mere testis can hardly ever be any objection to the operation; the sole consideration is the spermatic chord: if this be in a natural state, and free from disease, the operation not only may, but ought to be performed, let the condition of the testicle be what it may; if the spermatic chord be really diseased, the operation ought not to be attempted. For although, on the one hand, a probability of success will vindicate an attempt, even though it should fail; yet, on the other, where there is no such probability, an operation, though performed in the most dextrous manner, will prove only a more ingenious method of tormenting.

"This, therefore, (the state of the spermatic chord) is a matter, which may require our most serious consideration; since, on this it is (when the disease appears to be local) that we must found our judgment; and by this must form our resolution, either to leave a man to the truly miserable fate of being slowly, though certainly, destroyed, by a cruelly painful, and frequently very offensive disease; or endeavour to save, and preserve him in health and ease, by means, which have so often proved successful, as truly to deserve the appellation of *probable*.

"All writers on this subject, agree in saying, that if the spermatic process has partaken of the diseased state of the testicle, that is, has become enlarged and hardened, and such enlargement and induration extends itself quite up to the abdominal muscle, that the operation of castration ought not to be performed, because it will not only prove successless, but will hasten the death of the patient. And this is, in some degree, most certainly true; but not without some limitation. A truly and absolutely diseased state of the spermatic chord, in any part of it, is certainly a very material objection to the operation, as it most commonly proves a bar to the success of it: and a morbid state of the same chord quite as high as the abdominal muscle, that is, of all that part of it, which is external to the cavity of the belly, is a just and full prohibition against such attempt. But, on the other hand, it must be observed, that every apparently-morbid alteration of the spermatic chord is not really such; and, therefore, that every enlargement, induration, fulness, &c. which seems to alter the spermatic vessels from that state, which is called a healthy and natural one, is not to be regarded as a disease; at least, not as such a disease as is sufficient to prohibit the attempt to obtain a cure by extirpation.

"The difference between these, it is the duty of every practitioner to become perfectly acquainted with, as it is from a consideration of these, that he ought to determine, whether he may, with that firmness and assurance, which the probable expectation of success will give him, propose and advise castration; or find himself obliged in conscience to dissuade, or refuse, the performance of it.

"When the spermatic vessels are not only turgid and full, but firm and hard; when the membrane, which invests and connects them, has lost its natural softness and cellular texture, and has contracted such a state, and such adhesions, as not only greatly to exceed its natural size, but to become unequal, knotty, and painful, upon being handled, and this state has possessed all that part of the chord, which is between the opening in the oblique muscle and the testicle, no

prudent, judicious, or humane man, will attempt the operation; because he will, most certainly, not only do no good to his patient, but will bring on such symptoms as will most rapidly, as well as painfully, destroy him. Of this, there are so many proofs, that the truth of it is incontestible.

"In some modern French books, we have, indeed, miraculous accounts of operations of this kind, performed by dividing the tendon of the oblique muscle, by tracing the diseased spermatic vessels within the cavity of the belly, and there making the ligature and excision: but these are operations, which make a figure in books only, and are performed only by visionary writers; or, if ever they have been practised, serve to shew the rashness and insensibility of the operators, much more than their judgment, or humanity. Whoever (notwithstanding these tales) performs the operation in the circumstances above-mentioned, will prove himself much more hardy than judicious; and will destroy his patient, without having the satisfaction of thinking that his attempt, though successless, was yet vindicable;—the only circumstance which can, in such events, give comfort to a man, who thinks rightly.

"On the other hand, as I have already said, every enlargement of the spermatic chord is not of this kind, nor by any means sufficient to prohibit or prevent the operation.

"These alterations, or enlargements, arise from two causes, viz. a varicose dilatation of the spermatic vein, and a collection, or collections, of fluid in the membrane investing and enveloping the said vessels. In the first place, as there is no reason in nature why a testicle, whose vessels have previously (for some time perhaps) been in a varicose state, should not become scirrhous; so it is also clear, that the scirrhosity seizing such testicle will by no means remove, or even lessen such varicose dilatation of the vessels from which it is dependent; on the contrary, will, most probably, and indeed does most frequently, increase such distention: but such mere varicose enlargement of the vessels, whether it be previous or consequential to the morbid state of the testis, does not, nor ought to prevent the removal of it, if otherwise fit and right. It is, indeed, an objection to the doctrine of Mr. Le Dran, and a few other writers, who make no ligature on the chord, and trust to a slight contusion of it between the finger and thumb for a suppression of the hemorrhage; but is none to the rest of the operation, as I can, from experience, testify.

"In the next place, the diseased state of a truly scirrhous testicle, its weight, and the alteration that must be made in the due and proper circulation of the blood, through both it and the vessels from which it is dependent, may and do concur in inducing a varicose dilatation of the spermatic vein, without producing that knotty, morbid alteration and hardness, which forbid our attempts. Between these, a judicious and experienced examiner will generally be able to distinguish.

"In the former (the truly diseased state), the chord is not only enlarged, but feels unequally hard and knotty; the parts of which it is composed are undistinguishably blended together; it is either immediately painful to the touch, or becomes so, soon after being examined; the patient complains of frequent pains shooting up through his groin into his back; and from the diseased state of the membrane composing the tunica communis, such adhesions and connexions are sometimes contracted, as either fix the process in the groin, or render it difficult to get the finger and thumb quite round it.

"In the other (the mere varicose distention), the vessels, though considerably enlarged and dilated, are nevertheless smooth, soft, and compressible; the whole process is loose and free, and will easily permit the fingers of an examiner to go quite round it, and to distinguish the parts of which it is composed; it is not painful to the touch; nor does the examination of it produce, or occasion, those darting pains, which almost always attend handling a process malignantly indurated.

"I do not say that the distinction between these two states is always and invariably to be made; but that it often may, I know from repeated experience: and that the operation may safely be attempted, and successfully be performed, I know from the same experience. The state of a man, left to the mercy of a malignant scirrhus, is so truly deplorable, that we cannot be too attentive in examining the precise nature of each individual case, and in embracing every opportunity of giving him that relief, which it may at one time be in our power to give, and which, the lucky opportunity missed, it may never be in his power again to receive.

"The other circumstance, which I have mentioned as capable of deceiving an operator, and inducing him to believe, that the spermatic chord is much more diseased than it really is, and thereby deterring him from the performance of an operation, which might prove successful, is the extravasation, or collection of

fluid in the cellular membrane enveloping the spermatic vessels, between the abdominal opening and the testis.

"In the cellular membrane, leading to a diseased testicle, it is no very uncommon thing to find collections of extravasated fluid. These, as they add considerably to the bulk, and apparent size of the process, make the complaint appear more terrible; and, as I have just said, less likely to admit relief.

"When the extravasation is general, through all the cells of the investing membrane, and the spermatic vessels themselves are hardened, knotty and diseased, the case is without remedy; for, although a puncture, or an incision, will undoubtedly give discharge to some, or even the greatest part of the fluid; yet this extravasation is so small, and so insignificant a circumstance of the disease, that the parts, in this state, are so little capable of bearing irritation, that an attempt of this kind must be ineffectual, and may prove mischievous.

"But, on the other hand, collections of water are sometimes made in the same membrane, from an obstruction to the proper circulation through the numerous lymphatics in the spermatic process, while the vessels themselves are really not diseased, and therefore very capable of permitting the operation. In this case, the fluid is generally in one cyst, or bag, like to an encysted hydrocele, and the spermatic chord, cyst and all, are easily moveable from side to side; contrary to the preceding state, in which the general load in the membrane fixes the whole process, and renders it almost immoveable.

"A discharge of the fluid will, in this case, enable the operator to examine the true state of the process, and, as I have twice or thrice seen, put it into his power to free his patient from one of the most terrible calamities which can befal a man.

"There is one more circumstance relative to the scirrhous testicle, which appears to me to be worth attending to, as I cannot help thinking that it has misled many, who have not had sufficient opportunity of comparing theory with practice.

"It has been confidently asserted, and is generally believed, that a scirrhous testicle never begins in the epididymis of the said testicle. The consequence of this doctrine is, that when a disease, which affects a testicle, by enlarging and hardening it, makes its first attack on the epididymis only, such disease is not allowed to be a scirrhus, nor permitted to be treated as such.

"That inflammatory kind of tumour, which in the virulent gonorrhea, siezes the testicle, and is called the hernia humoralis, affects the epididymis; and, even under the best care, sometimes leaves it too large, and too hard. This is said never to end in, or produce a scirrhus; and, I do not recollect, that I have ever known it to do so. The disease, which consists in an induration and enlargement of the whole testicle, in the more confirmed lues, affects the epididymis also, as well as the glandular part of the testicle; and I do not remember to have seen it, either become cancerous, or not yield to mercury, properly administered. But that a true scirrhus, or cancer, sometimes makes its first attack on the epididymis, which it alters and spoils, before it at all affects the testicle, is a truth, of which I have not the least doubt. Among others, I formerly believed the contrary doctrine; and, in the first edition of this book, have given it as my opinion: but I am, from experience, so perfectly convinced of the truth of what I have now asserted, that I think myself obliged to declare it. The mistake, I suppose to have been made by the first propagators of this opinion, thus: The hernia humoralis, and the venereal sarcocele, always enlarge the epididymis, and generally leave it somewhat too hard: both these have, by adventurous and unknowing people, been mistaken for scirrhi; but it being found, by experience, that these alterations in the epididymis, were either totally removed by medicine, or, if any part remained, it continued harmless through life; an inference was drawn, that as true scirrhi are not often either removed by medicine, or continue harmless, therefore an original affection of the epididymis could never be a true scirrhus: a deduction, which the premises do not by any means authorise; and which I am satisfied, is not true." (*Extract from Pott's Treatise on the Hydrocele, &c.*)

In the preceding remarks, we find, that Pott considered sarcocele and cancer of the testicle, only as different stages of the same disease; but, I am of opinion, that the only reason for this doctrine must have been built on the fact now so well established, that every kind of swelling is liable to be eventually converted into cancer. The observations of Mr. Home, particularly illustrate the truth of the latter remark.

SCIRRHUS AND CANCER OF THE TESTICLE.

Dr. Baillie has noticed, that the testicle is often found much enlarged in its size, and changed into a hard mass, of a brownish colour, which is generally

more or less intersected by membrane. In this disease, there is no vestige of the natural structure; but, cells are frequently observable in it, containing a sanious fluid; and, sometimes, there is a mixture of cartilage. Dr. Baillie considers this state as the true scirrhous testicle; and, according to the progress of the disease, the epididymis, and spermatic chord, are more or less, or not at all affected. A foul deep ulcer is, at length, frequently formed, or else a fungus is thrown out, when it is called, the true cancer of the testicle. This affection is characterized, in the living subject, by its great hardness; the frequent pain in the part darting from it along the spermatic chord to the loins. The chord itself, at last, becomes diseased, and the health impaired. The ulcer and fungus form additional symptoms. (See *Baillie's Morbid Anatomy.*)

SOFT CANCER OF THE TESTICLE.

This part is very subject to a disease, which, though of a very malignant and incurable nature, is very different from the true cancer, already described. It has been particularly noticed by Mr. Abernethy, under the name of *Medullary Sarcoma*. In most of the instances, which this gentleman has seen, the tumour, when examined after removal, has appeared to be of a whitish colour, resembling, on a general and distant inspection, the appearance of the brain, and having a pulpy consistence. Mr. Abernethy has also often seen it of a brownish red appearance. The following case is related, to illustrate the nature and progress of the disease.

"A tall, thin, healthy-looking man, of about forty years of age, had, about fifteen years before, a swelled testicle from a gonorrhœa; the epididymis remained indurated. Six years afterwards it became enlarged, and a hydrocele at the same time formed. Half a pint of water was discharged by a puncture, but inflammation succeeded the operation, and this testis became very large. An abscess formed, and burst in the front of the scrotum, and the testis subsided in some degree. Mercury was employed to reduce it, but without effect. The part, however, was indolent, and gave the patient no trouble but from its bulk.

"About a year afterwards, a gland enlarged in the left groin (the same side as the testis): another then became swoln in the right groin, and, in the course of two years, several glands in each groin had obtained a very considerable magnitude. At this period, he was admitted into St. Bartholomew's Hospital, under the care of Mr. Long. The testis was, at this time, between four or five inches in length, and about three in breadth; it resembled its natural form, and was indolent in its disposition. The spermatic chord was thickened, but not much indurated. Four or five glands were enlarged in the groin on both sides; each of which was of the size of a very large orange; and when observed together, they formed a tumour of very uncommon shape and magnitude.

"They gradually increased in size for several months, till at last the skin appeared as if unable to contain them any longer. It became thin, inflamed, and ulcerated, first in the left groin, and thus exposed one of the most prominent tumours. The exposed tumour inflamed and sloughed progressively, till it entirely came away. As the sloughing exposed its vessels, which were large, they bled profusely, insomuch that the students endeavoured, but in vain, to secure them by ligatures: for the substance of the tumour was cut through, and torn away in the attempt. Pressure by the finger, continued for some time, was the only effectual mode of restraining this hemorrhage.

"The loss of one gland relieved the distended skin, which had only ulcerated on the most prominent part of the tumour, and had not become diseased. It now lost its inflamed aspect: granulations formed, and a cicatrix took place. In the opposite groin a similar occurrence happened. One gland, exposed by the ulceration of the skin, sloughed out, being attended by the circumstances just recited. However, before the skin was cicatrized, ulceration had again taken place in the right groin, in consequence of the great distention of the skin from the growth of the tumour; and sloughing had begun in the tumour, when the patient, whose vital powers had long been greatly exhausted, died." (See *Surgical Observations, &c.* 1804, *by J. Abernethy, F. R. S. &c.*)

SCROPHULA OF THE TESTICLE.

This part is sometimes converted into a truly scrophulous mass. It is usually enlarged, and, when cut into, a white, or yellowish-white, curdly substance is seen, which is sometimes, more or less, mixed with pus. This affection may be distinguished from a scirrhous testicle by its greater softness, by the little pain felt in it, and by its not affecting the health so much. (See *Baillie's Morbid Anatomy*)

Mr. Pott has regarded every kind of sarcocele as demanding an early performance of castration; and the observations which I have had opportunities of making, lead me to agree with this celebrated

writer, in the general truth of the remark. But (setting out of consideration the swelling and hardness arising from the common hernia humoralis) there are a few diseased enlargements of the testicle, which certainly do frequently diminish and remain in a state which does not at all impair the health, after taking cicuta, and other alterative medicines, wearing a suspensory, and rubbing mercurial ointment on the scrotum. Many of such cases I have suspected to be scrophulous diseases.

Dr. Baillie has noticed some other affections of the testicle, in which it becomes bony, cartilaginous, &c.; but, on these it is not necessary for us to dwell in this dictionary. The preceding observations may be considered as relating expressly to the diseases for which castration is generally performed. See *Castration.*

FUNGUS OF THE TESTICLE.

In a former work, I described "a particular affection of the testicle, in which a fungus grows from the glandular substance of this body, and, in some instances, from the surface of the tunica albuginea. This excrescence is usually preceded by an enlargement of the testicle, in consequence of a bruise, or some species of external violence. A small abscess takes place, and bursts, and from the ulcerated opening the fungus gradually protrudes." I then proceeded to represent how unnecessary and improper it was to extirpate the testicle, on account of this affection, if, after the subsidence of the inflammation, the part should not seem much enlarged and indurated. I recommended the fungus to be cut off, or else destroyed with caustic; and I founded my advice on a successful attempt of the first kind, which was made in St. Bartholomew's Hospital, by Sir James Earle, a little while before my book was published. (See *First Lines of the Practice of Surgery*, p. 399.)

Since this period, an interesting little paper has been written on the subject, by my friend Mr. Lawrence, who has favoured the public with a more particular account, and nine cases illustrative of the causes, symptoms, and progress of the disorder. According to Mr. Lawrence, the patient generally assigns some blow, or other injury, as the cause of the complaint; in other instances, it originates in consequence of the hernia humoralis from gonorrhœa, and sometimes appears spontaneously. A painful swelling of the gland, particularly characterized by its hardness, is the first appearance of the disease. After a certain length of time, the scrotum, growing gradually thinner, ulcerates; but, the opening, which is thus formed, instead of discharging matter, gives issue to a firm, and generally insensible fungus. The surrounding integuments and cellular substance, are thickened and indurated by the complaint, so that there appears to be altogether a considerable mass of disease. The pain abates, and the swelling subsides considerably, when the scrotum has given way. In this state, the disorder appears very indolent; but if the fungus be destroyed by any means, the integuments come together, and a cicatrix ensues, which is inseparably connected with the testicle. Mr. Lawrence next informs us, that if the part be examined while the fungus still remains, the excrescence is found to have its origin in the glandular substance of the testicle itself; that the coats of the part are destroyed to a certain extent; and that a protrusion of the tubuli seminiferi, takes place through the aperture thus formed. Mr. Lawrence says, he has often ascertained the continuity of the excrescences with the pulpy substance of the testicle, of which more or less remains, according to the difference in the period of the disorder. The same gentleman thinks, that the glandular part of the testicle experiences an inflammatory affection in the first instance, in consequence of the violence inflicted on it; and that the confinement of the swollen substance, by the dense and unyielding tunica albuginea, sufficiently explains the peculiar hardness of the tumour, and the pain which is always attendant on this stage of the disorder. The absorption of the coats of the testis, and of the scrotum, obviates the tension of the parts, and, thereby, restores ease to the patient, at the same time that the fungus makes its appearance externally.

With regard to the treatment, Mr. Lawrence is of opinion, that, if the complaint were entirely left to itself, the swelling would probably subside, the fungus shrink, and a complete cure ensue, without any professional assistance; but, he adds, that the disorder is so indolent in this stage, that a spontaneous cure would not be accomplished till after much time. He says, that the excrescence may be removed with a knife, or, if the nature of its attachment permit, with a ligature, or that it may be destroyed with escharotic applications. Mr. Lawrence very judiciously gives the preference to removing the tumour to a level with the scrotum, by means of the knife, as the most expeditious and effectual mode of treatment. He can discern no ground whatever for proposing castration in this malady, since, in no part of its progress, nor in any of its possible consequences

and effects, can it expose the patient to the slightest risk.

Mr. Lawrence also mentions the possibility of there being other kinds of funguses, which may be met with, growing from the testicle, and quotes an instance, in which Mr. Macartney found a fungus, of a firm and dense structure, growing from the tunica albuginea, while all the substance of the testicle itself was sound. Mr. Macartney was so kind as to shew me the preparation, affording a clear specimen of the second kind of fungus. The cases drawn up by Mr. Lawrence are, in my opinion, highly interesting, and may be read in the *Edinb. Med. and Surgical Journal for July*, 1808.

TETANUS. (from τεινω, to stretch.) Tetanus is defined by all authors to be a more or less violent, and more or less extensive, contraction of the muscles, attended with tension and rigidity of the parts affected.

It presents itself in four different states.

When its effects are confined to the muscles of the jaw and throat, it is called *trismus*, or *locked-jaw;* when all the body is affected and becomes rigid, but retains its ordinary straightness, the case is named *tetanus*. When the body is bent forwards, the disease is termed *emprosthotonos*; and *opisthotonos*, when the curvature is backward.

To these four forms, some writers have added a fifth, which they denominate *pleurosthotonos*, and which is characterized by the body being drawn to one side. It is the *tetanus lateralis* of Sauvages.

Each of these states is strikingly different: the two first often prevail at the same time, forming what may be termed *complete tetanus*.

As M. Larrey also observes, tetanus may likewise be divided into the *acute* and *chronic*, according to its greater, or lesser intensity.

The first is exceedingly dangerous, and usually fatal.

Chronic tetanus is less intense, and, on account of the more gradual progress of the symptoms, affords more opportunity of being successfully treated. (*Larrey, in Mém. de Chirurgie Militaire, Tom.* 1. *p.* 235, 236.)

Tetanus may also be distinguished into the *traumatic*, or that arising from wounds, being the case with which surgeons have principally to deal; and into the *idiopathic*, or that proceeding from a variety of other causes.

This disorder, which may be excited by different causes, is much more common in warm climates than our own. However, it sometimes occurs among us, especially in consequence of wounds, and, more particularly, after such injuries of tendinous and ligamentous parts. It is one of the most fatal symptoms, which can possibly arise in cases of wounds, and, therefore, demands the most assiduous attention of the surgeon.

M. Larrey observed, that gunshot wounds in the course of the nerves, and such injuries of the joints, often produce tetanus in the climate of Egypt, particularly when the weather, or temperature, passed from one extreme to the other, in damp situations, and in those which were adjacent to the Nile, or the sea. What he terms dry and irritable temperaments, were the most subject to the disorder, the event of which was found to be almost always fatal (*Larrey, Op. et Loc. cit.*)

Dr. Cullen remarks, that "tetanic complaints may, from certain causes, occur in every climate that we are acquainted with; but they occur most frequently in the warmest climates, and, most commonly in the warmest seasons of such climates. These complaints affect all ages, sexes, temperaments, and complexions. The causes from whence they commonly proceed, are cold and moisture applied to the body while it is very warm, and especially the sudden vicissitudes of heat and cold. Or, the disease is produced by punctures, lacerations, or other lesions of nerves in any part of the body. There are, probably, some other causes of this disease; but, they are neither distinctly known nor well ascertained. Though the causes mentioned do, upon occasion, affect all sorts of persons, they seem, however, to attack persons of middle age, more frequently than the older or younger, the male sex more frequently than the female, and the robust and vigorous more frequently than the weaker.

"If the disease proceed from cold, it commonly comes on in a few days after the application of such cold; but, if it arise from a puncture, or other lesion of a nerve, the disease does not commonly come on for many days after the lesion has happened, very often when there is neither pain nor uneasiness, remaining in the wounded, or hurt part, and, very frequently, when the wound has been entirely healed up.

"The disease sometimes comes on suddenly to a violent degree; but, more generally, it approaches by slow degrees to its violent state. In this case, it comes on with a sense of stiffness in the back part of the neck, which, gradually increasing, renders the motion of the head difficult and painful. As the rigidity of the neck comes on, and increases, there is commonly, at the same time, a sense of uneasiness felt about the root of the tongue; which, by degrees, becomes a

difficulty of swallowing, and, at length, an entire interruption of it. While the rigidity of the neck goes on increasing, there arises a pain, often violent, at the lower end of the sternum, and from thence shooting into the back. When this pain arises, all the muscles of the neck, and particularly those of the back part of it, are immediately affected with spasm, pulling the head strongly backwards. At the same time, the muscles that pull up the lower jaw, which, upon the first approaches of the disease, were affected with some spastic rigidity, are now generally affected with more violent spasm, and set the teeth so closely together, that they do not admit of the smallest opening.

"This is what has been named the *locked jaw* (*Trismus*), and is often the principal part of the disease. When the disease has advanced thus far, the pain at the bottom of the sternum returns very frequently, and with it, the spasms of the hind-neck and lower jaw, are renewed, with violence and much pain. As the disease thus proceeds, a greater number of muscles come to be affected with spasms. After those of the neck, those along the whole of the spine become affected, bending the trunk of the body strongly backwards; and this is what has been named the *Opisthotonos*.

"In the lower extremities, both the flexor and extensor muscles are commonly at the same time affected, and keep the limbs rigidly extended. Though the extensors of the head and back are usually the most strongly affected, yet the flexors, or those muscles of the neck that pull the head forward, and the muscles that should pull down the lower jaw, are often at the same time strongly affected with spasm. During the whole of the disease, the abdominal muscles are violently affected with spasm, so that the belly is strongly retracted, and feels as hard as a piece of board.

"At length, the flexors of the head and trunk become so strongly affected as to balance the extensors, and to keep the head and trunk straight, and rigidly extended, incapable of being moved in any way; and, it is to this state the term of *Tetanus* has been strictly applied. At the same time, the arms little affected before, are now rigidly extended; the whole of the muscles belonging to them being affected with spasms, except those that move the fingers, which often to the last retain some mobility. The tongue also long retains its mobility; but, at length, it also becomes affected with spasms, which, attacking certain of its muscles only, often thrust it violently out between the teeth.

"At the height of the disease, every organ of voluntary motion seems to be affected, and, amongst the rest, the muscles of the face. The forehead is drawn up into furrows; the eyes, sometimes distorted, are commonly rigid and immoveable in their sockets; the nose is drawn up, and the cheeks are drawn backwards towards the ears, so that the whole countenance expresses the most violent grinning. Under these universal spasms, a violent convulsion comes on, and puts an end to life.

"The spasms are every where attended with most violent pains. The utmost violence of spasm is, however, not constant; but after subsisting for a minute or two, the muscles admit of some remission of their contraction, although of no such relaxation, as can allow the action of their antagonists. This remission of contraction gives also some remission of pain; but neither is of long duration. From time to time, the violent contractions and pains are renewed, sometimes every ten, or fifteen minutes, and that often without any evident exciting cause. But, such exciting causes frequently occur; for almost every attempt at motion, as attempting a change of posture, endeavouring to swallow, and even to speak, sometimes gives occasion to a renewal of the spasms over the whole body.

"The attacks of this disease are seldom attended with any fever. When the spasms are general and violent, the pulse is contracted, hurried, and irregular; and the respiration is affected in like manner; but, during the remission, both the pulse and respiration usually return to their natural state. The heat of the body is commonly not increased; frequently the face is pale, with a cold sweat upon it; and, very often, the extremities are cold, with a cold sweat over the whole body. When, however, the spasms are frequent and violent, the pulse is sometimes more full and frequent, than natural; the face is flushed, and a warm sweat is forced out over the whole body.

"Although fever be not a constant attendant of this disease, especially when arising from a lesion of nerves; yet, in those cases, proceeding from cold, a fever sometimes has supervened, and is said to have been attended with inflammatory symptoms. Blood has often been drawn in this disease; but, it never exhibits any inflammatory crust; and all accounts seem to agree, that the blood drawn seems to be of a looser texture, than ordinary, and that it does not coagulate in the usual manner.

"In this disease, the head is seldom affected with delirium, or even confusion of thought, till the last stage of it; when,

by the repeated shocks of a violent distemper, every function of the system is greatly disordered.

"It is no less extraordinary, that, in this violent disease, the natural functions are not either immediately, or considerably affected. Vomitings sometimes appear early in the disease; but commonly they are not continued; and it is usual enough for the appetite of hunger to remain through the whole course of the disease; and what food happens to be taken down, seems to be regularly enough digested. The excretions are sometimes affected, but not always. The urine is sometimes suppressed, or is voided with difficulty and pain. The belly is costive; but, as we have hardly any accounts, excepting of those cases, in which opiates have been largely employed, it is uncertain, whether the costiveness has been the effect of the opiates or of the disease. In several instances of this disease, a miliary eruption has appeared upon the skin, but whether this be a symptom of the disease, or the effect of a certain treatment of it, is undetermined. In the mean while, it has not been observed to denote either safety or danger, or to have any effect in changing the course of the distemper." —(*First Lines of the Practice of Physic, vol.* 3.)

According to M. Larrey, the opisthotonos, is more seldom observed, than the emprosthotonos, and the experience of this gentleman taught, that the former was the most rapidly fatal. It appears, says he, that the violent extension of the vertebræ of the neck, and the manner, in which the head is thrown back, cause strong compression of the spinal marrow, and a permanent contraction of the larynx and pharynx.—(*Larrey, in Mém. de Chirurgie Militaire, Tom.* 1. *p.* 240.)

This experienced writer notices how much the nerves of the neck and throat seem generally to be affected on the invasion of this disease, and the consequent contraction of the muscles of these parts, which is soon attended with difficulty of deglutition and respiration. The patients then experience, if not a dread of liquids, at least a great aversion to them, which often prevents the administration of internal remedies; and if the wound is out of reach of the interference of art, the patient is doomed to undergo the train of sufferings attendant on this cruel and terrible disorder. Nothing can surmount the obstacles, which present themselves in the œsophagus. The introduction of an elastic gum catheter into this canal, through the nostrils, is followed by convulsions and suffocation. "I have tried this means (says Larrey) on the person of M. Navailh, a surgeon of the second class, who died of a locked jaw, brought on by a wound of the face, accompanied with a comminuted fracture of the bones of the nose, and part of the left orbit.

"In the examination of the bodies of persons dead of tetanus, I have found the pharynx and œsophagus much contracted, and their internal membrane red, inflamed, and covered with a viscid reddish mucus.

"Hydrophobia, hysteria, and several other nervous diseases, likewise produce their chief effects upon these organs, and the result appears to be the same. So, I have just remarked, when tetanus is arrived at its worst degree, the patients have a great aversion to liquids, and, if they are forced to swallow them, immediate convulsions are excited. This circumstance was particularly observed in M. Navailh."—(*Mém. de Chirurgie Militaire, Tom.* 1. *p.* 247, 248.)

Hippocrates has taken notice of tetanic affections, in several parts of his works, and he seems to regard the disorder only as a consequence of other diseases, or of wounds or ulcers of the nervous or tendinous parts, of which symptomatic kind of opisthotonos he gives three remarkable cases in lib. 5. § 7. *de Morb. Vulg.* and repeats them in another place; but some of the symptoms, which he relates, are said not to be now observed. Galen, Cœlius Aurelianus, Aretæus, &c. seem only to have copied Hippocrates, with the addition of some supposititious symptoms, which really do not appear. The account given by Bontius is also deemed very defective. Dr. Lionel Chalmers, of Charles Town, South Carolina, states, that when the disease forms very quickly, and invades the unfortunate person with the whole train of its mischievous symptoms, in a few hours, the danger is proportioned to the rapidity of the attack, and that patients thus seized, generally die in 24, 36, or 48 hours, and very rarely survive the third day. But, when the disease is less acute, few are lost after the ninth, or eleventh. However, perhaps, this gentleman's descriptions of the disease in South Carolina may not be altogether applicable to it in our climate. (See *Med. Obs. and Inq. vol.* 1. *p.* 92, 93.)

Tetanus was generally considered by the ancients as a mortal disease; but, we are now aware, that, until of late years, medical practitioners had no just notions concerning the proper treatment, and that since more judicious methods have been practised, many persons, afflicted with tetanus, have recovered. Although the treatment, which has succeeded in some instances, has not been found successful in others, yet, the degree of

success proves, that the affection is not invariably incurable, and, more modern experience has pointed out additional plans, the efficacy of which entitles them to trial.

When tetanus is evidently dependent on the particular state of a wound, practitioners in general agree, that the wounded part should be completely removed, whenever such an operation is practicable; or that, at least, all communication between the injured place and the brain, should be done away either by making a complete division of the nerves of the part, or destroying them with caustics. Some writers, however, remonstrate against this practice, and adduce reasons of the following kind. One of the principal grounds of objection is, that greater success does not attend the treatment of tetanus, when the wounded part is amputated or destroyed, than when no operation of this kind is performed. Any man who will take the trouble to consult the cases of tetanus on record, will find this to be a matter of fact; and, though hypothesis may sanction the trial of the plan, experience is not at all in favour of it, when it is judged of, as it ought to be, by the results of numerous cases compared together. No practitioner could justifiably amputate, or destroy the wounded part, no one would ever think of such a thing, before the symptoms had, at least, decidedly evinced the nature of the disorder. Could it be known beforehand, that tetanus, which in this country is not a frequent affection, would certainly follow any particular appearances of a wound, then the amputation, or destruction of it, with caustic, would undoubtedly be proper, and promise to be an effectual preventive. But, experience has now fully proved, that such an operation, after tetanus has commenced, does no good whatever, since at least as many have died, when so treated, as others, who have not submitted to the method. If the operation do no good, it must be hurtful, and increase the number of deaths; because limbs must frequently be removed, and a certain proportion of persons, on whom amputation is performed, on any account, always perish. However, the wounds, which most commonly occasion tetanus, are those of the fingers and toes, and the removal and loss of one of these parts is a matter of less importance.

The valuable observations of M. Larrey, in favour of amputation, will be found towards the conclusion of the present article, as well as his other interesting remarks upon the various modes of treating tetanus.

Experience has shewn, that opium has sometimes been a very efficacious remedy, in cases of tetanus; but, from the same source of knowledge, we also learn, that it can only become a means of cure, when exhibited in very powerful doses, such, indeed, as would be exceedingly dangerous in any other instances. The common plan has been to give the medicine, at first, in moderate doses, and repeat them, every two, or three hours, or, at longer intervals, according to circumstances. In this manner, twenty, thirty, forty grains, and even more, have frequently been administered, in the space of four and twenty hours, without any other effect, than that of diminishing a little the spasms and pain; the patient having neither sleep, nor drowsiness, nor any of the other effects, usually resulting from this medicine, even when exhibited in much smaller quantities. It is, for such reasons, that the doses may be boldly augmented, in proportion as the violence of the symptoms seems to demand. Opium, however, does not fail to have sometimes inconveniencies, which prevent its being exhibited as freely as one might wish, under other circumstances. The functions of the stomach and bowels have been known to be so seriously impaired, in consequence of the medicine, that its exhibition could be no longer continued, but was left off, before any salutary effects had been produced.

Another circumstance, which deserves particular attention, is, that although the first doses of opium may produce some abatement of the symptoms, the benefit is not of long continuance, and fresh doses of the medicine must be administered, some time before the operation of the previous one ceases. This plan must be persevered in, as long as the symptoms have any tendency to reappear; and it is not, till some time after they have seemed to be subdued, and to have left the patient in a long and uninterrupted interval of ease, that one should venture to diminish either the quantity, or number of the doses of the medicine.

Opium is sometimes prevented from being taken, in an effectual manner, by the difficulty of swallowing, which is a common symptom of this disease, and occurs particularly often, when the disorder is in an advanced stage. I once conceived, that medicines might, under such circumstances, be introduced into the stomach, by means of a hollow bougie, passed, from one of the nostrils, down the œsophagus. I have lately been informed, however, that using a bougie in this way brings on very insupportable fits of spasm; and the truth of this objection is fully confirmed by M. Larrey. The occurrence of a difficulty of swallowing medicines, when the disease has made some progress, is, at all events, an

urgent reason, for having recourse, without delay, to such remedies, as have obtained repute, and of these, opium is undoubtedly one of the principal. Should it be found to be impracticable to convey opium into the stomach, after the difficulty of swallowing comes on, authors advise the medicine to be exhibited in glysters, in such doses as the violence of the disorder demands. The costiveness, which opium usually brings on, may commonly be obviated by emollient glysters, and laxative medicines, as occasion requires.

Analogous reasoning has led to the supposition, that the efficacy of opium might be increased, by employing some other medicines of the antispasmodic class, and, with this view, musk and camphor have been given, as being justly regarded as among the most powerful remedies of this kind. But, although some practitioners have thought, that they have seen good effects result from musk, yet the majority of practitioners, who have made trial of both this and camphor, in cases of tetanus, have found no reason to recommend these medicines. Possibly, this may be owing, in some instances, to sufficient doses not having been exhibited, or to the musk not being of a good quality. One hundred and fifty grains of musk, however, have been given in the space of twelve hours, to a young girl, thirteen years old, affected with an incipient tetanus; but, no salutary effect on the disorder was produced.

Analogy has also led to the employment of the warm bath, as a plan, which seemed to promise great benefit, by producing a relaxation of the contracted muscles. But, notwithstanding this means has appeared, in a few instances, to occasion some little relief, particularly, when the practitioner has been content with mere fomentations, it generally fails, and, often, has even done mischief. This may perhaps be, in some measure, ascribable to the disturbance and motion, which the patient must necessarily undergo, in order to get into the bath; for, it is very well known, that every exertion, on the part of the patient, is very apt to excite most violent paroxysms of spasm. The author of the article Tetanus, in the Encyclopédie Méthodique, mentions his having seen the warm bath do harm, in two or three cases, in which it was expected to do good. Though numerous writers have recommended the trial of the plan, it would be difficult to trace, in their accounts, any facts, which decidedly shew, that its adoption has ever been followed by unequivocal benefit. Dr. Hillary, who practised, a long while, in the warm climate of America, where tetanus is very common, disapproves of this method of treatment. He observes, that although the use of the warm bath may appear to be very rational, and promise to be useful, he has always found it much less serviceable, than emollient and antispasmodic fomentations; and, he also mentions, that he has sometimes seen patients die, the very moment, when they came out of the bath, notwithstanding they had not been in it more, than twenty minutes, the temperature of the water being likewise not higher than 29 or 30 of Reaumur's thermometer. (See *Hillary on the Air and Diseases of Barbadoes.*)

De Haen also relates a similar fact of a patient dying, the instant he was taken out of the warm bath.

It was, in all probability, the bad effects of the warm bath, which induced practitioners to try what might be effected by the cold one. Of all the remedies, which have been employed in cases of tetanus, the cold bath seems to be that, which has been attended with the greatest success. Dr. Wright has published, in the *Medical Observations and Enquiries*, *Vol.* 6, a paper, in which may be found a narrative of the first trials of this method, which were all successful. The plan is said to be at present preferred throughout all the West Indies. The way adopted consists in plunging the patient in cold water, and in that of the sea, when at hand, in preference to any other; or else in throwing from a certain height, several pailfuls of cold water over his body. After this has been done, he is to be very carefully dried with a towel, and put to bed, where he should only be lightly covered with clothes, and take twenty or thirty drops of laudanum. The symptoms usually seem to give way, in a certain degree, but, the relief, which the patient experiences, is not of long duration, and it is necessary to repeat the same measures, at the end of three, or four hours. They are to be repeated in this manner; that is to say, at such intervals, until those of freedom from the attacks of the disorder increase in length. This desirable event generally soon follows, and ends in a perfect cure. Wine and bark were sometimes conjoined with the foregoing means, and seemed to co-operate in the production of the good effects. Dr. Wright concludes the account with the following remark, sent to him with a case, by Mr. Drummond, of Jamaica.—"I am of opinion, that opiates and the cold bath will answer every intention in the tetanus and such like diseases; for, whilst the opium diminishes the irritability, and gives a truce from the violent symptoms, the cold bath produces that wonderful tonic effect, so observable in this, and some other cases. Perhaps, the bark, joined with these, would render the cure more certain. May we not then

have failed in many cases, by using opiates alone in large doses, or, what probably is worse, with the warm bath, instead of the cold bath? And have we not reason to suspect that the increased doses of opium, that seemed requisite, when the warm bath was used, may have proved pernicious?" (*Vol.* 6, *p.* 161.)

Another remedy, which is said to have frequently effected a cure in tetanus, is mercury. It has been employed in France with the greatest success, as may be seen by referring to the forty-fifth volume of the *Journal de Médecine*. This remedy, however, should be resorted to, in an early period of the disorder. Mercurial frictions are preferred, and these are to be put in practice so as to bring on a quick affection of the mouth; taking care, however, not to render the soreness and salivation too violent. Some contend, that it matters not, whether mercury be rubbed into the body, or given internally. It is generally allowed, that opium may be advantageously exhibited at the same time.

Dr. Cullen mentions his having been informed, that the Barbadoes tar (*Psselæum Barbadense*) had cured tetanus in all its different degrees.

It was an opinion, entertained by this celebrated physician, that the cold bathing had neither been so frequently employed, nor found so commonly successful, in cases of tetanus from wounds, as in those from the application of cold.

Unctuous, balsamic, and spirituous embrocations; bleedings; and the application of blisters; which many practitioners have recommended, are not only useless remedies in the majority of cases, but even hurtful. Hence, none of the best physicians or surgeons, of the present day, ever advise them to be adopted.

The trial of strong shocks of electricity, in cases of tetanus, has been suggested. We have no fact, however, on record, of the method having done good in this disorder. (*Latta's System of Surgery, Vol.* 3. *p.* 61.)

It has also been proposed to exhibit, in cases of tetanus, some other very strong stimulants, besides opium, musk, and camphor; for instance, the fixed and volatile alkalies, ardent spirits, spices, &c.

Mr. Latta's sentiments are against the employment of opiates and the warm bath, and the great object, which he seems to be desirous of bringing about, are, a certain degree of inflammation and suppuration in the wounded part, and a general inflammatory diathesis. The measures, which he advises, with these views, will be fully understood by the following extract.

"Some cases (says this author) have been related, where a cure was evidently effected by opium; yet, from the numbers, who have suffered, under this management, we may freely say, that the cures are only in the proportion of one to eight, or nine. There are some cases, related by authors, where the patients have indeed recovered from the tetanus, but have soon after been attacked by complaints in their stomach, which quickly put an end to their life. Upon opening their bodies, the stomach was always found in a high state of inflammation, and sometimes actually mortified. Notwithstanding, therefore, it appears that the disease has sometimes been cured by opiates, I am clearly of opinion, that, in cases of tetanus, they ought almost to be entirely given up. The warm bath, I am likewise of opinion, ought not to be used; and, indeed, I must recommend a course almost directly opposite to that hitherto recommended and practised. Instead of putting the patient into a warm bath, I would plunge him into a tub of cold water, rendered still colder by the addition of vinegar. This ought to be repeated as often as the patient could bear it; and, in the mean time he ought to take the bark in very large doses, not less than two ounces in twenty-four hours, washing down every dose with a gill of port-wine. Thus, a degree of inflammatory diathesis might be produced in the system, without that danger of exciting a local inflammation and mortification in the stomach, which arises from immense doses of opium. I am not, however, for rejecting opiates entirely. A large dose may be given at first, and still farther augmented, if the first has no effect to mitigate the symptoms, until we have an opportunity of pushing the bark to its full extent. Besides this, we ought to endeavour to excite a local inflammation in the wounded part itself, and to raise this inflammation as high as is consistent with a resolution afterwards. We certainly know, that nothing promotes a general phlogistic diathesis through the system, more than a wound attended with an high degree of inflammation. In all relaxed habits we find, that, even in this climate, wounds are attended with less topical inflammation in summer than in winter; and, from perusing the best authors that have lately written upon this subject, I find that, in wounds productive of tetanus, there is an absolute want of this inflammation, so necessary to the cure and well-being of the patient. Nay, I myself know, from gentlemen of undoubted abilities in their profession, both in America and the East Indies, that, if inflammation and suppuration take place even in these climates, immediately after an injury that might be suspected of inducing a tetanus, such as, slight wounds or scratches on the fingers, or a splinter driven in below the nail, nothing of the

kind takes place. Hence, it is evident, or, at least, very probable, that if in a wound threatening to produce a tetanus, we could induce this inflammation, the disease would certainly be prevented. Our first care, therefore, should be, in warm climates, or in cases where we have reason to fear a tetanus, to dress the wound in such a manner as to bring on the requisite inflammation; and nothing can do this more effectually, than to enlarge it considerably, and apply a pledget dipped in warm oil of turpentine.

"It must be observed, however, that though dressings of this kind applied to the wound *before* a tetanus has come on, may very probably prevent it, yet we have no reason to believe, that they will remove it after it has come on. It is even doubtful, whether, after this dreadful disease has appeared, any application to the wounded part would raise the desired inflammation. In this case, we must do the best we can, instantly to remove, or at least palliate, the violence of the spasms; and, while we do so, an incision made above the original wound, and dressing this incision with warm oil of turpentine, might possibly be of service. The misfortune is, that now we have not time to wait for the effect of any ordinary medicine. The disease makes such rapid progress, that we are under a necessity of using violent remedies, even though we thereby run the risk of destroying our patients afterwards, as has been remarked of opiates. Mercury has been much recommended in the tetanus, as well as the hydrophobia, but has not often been attended with success in either. It is evidently too slow in its operation; but indeed, if we can give it in such quantities as to produce symptoms of salivation in a day or two at most, it has a chance of being useful; for, while it is producing a salivation quickly, it brings on a diathesis phlogistica; but I believe that, when it acts slowly, or after a salivation is thoroughly produced, it rather has a contrary effect, viz. that of relaxing the body, and thus tending to bring on the disease, if the wound be not healed before this happen. To avoid this, we ought to begin the unction with mercury as soon as the disease begins to shew itself; to rub in a very considerable quantity at once, and to stop as soon as the breath begins to turn fetid, or the gums to swell, lest a salivation should be excited, which would be contrary to the intention with which the medicine was exhibited." (*Latta, Vol.* 3, *p.* 70, &c.)

This gentleman is an advocate for cold bathing, which, he observes, should, like other remedies in tetanus, be pushed to its utmost extent. He recommends placing the patient in a tub, about two feet and a half high, and three feet in diameter, and pouring repeatedly over his head and shoulders, buckets of water, as cold as can be procured. This plan is to be "repeated, according to the urgency of the symptoms; but, not less, than four times, in four and twenty hours. During this time, the patient should be made to drink half a gill of the best brandy every hour, with two scruples of the powder of bark put into it; and, if his stomach can bear it, from two to three ounces of bark, with a bottle and an half of port-wine in twenty-four hours. If, by these means, the strength of the system increases, every symptom of the disease will decrease. I have already given my opinion with regard to opiates. The smallest dose that can be given, provided it will have any effect in relieving the spasms, ought to be adhered to; and, if they can be kept under without opium, so much the better; but, if not, no doubt we must give it in large quantities. The dose, indeed, cannot be ascertained; but, we must always remember, that, after the stimulant power of opium is gone, it has a very remarkable sedative effect, which, in persons not accustomed to it, is productive of something similar to downright intoxication, and a very great degree of debility consequent thereto. We must, therefore, be as careful as possible not to give immoderate doses of opium after the spasms are removed; or, at any time more than is absolutely necessary to keep them under. The strength of the system cannot be ultimately restored by medicines, which act only for a short time, and then lose their effect. It is evident that these are to be used only with a view to others, which act more permanently, though slowly.

"The sedative qualities of one dose of opium may indeed be prevented, by giving another before they have time to manifest themselves; but this would require an endless succession of doses. By far the best method seems to be to counteract them, by giving large quantities of the most nutritious food, as soon as the spasms are mitigated to such a degree as to allow the patient to swallow. This is conformable to the doctrines delivered by the late Dr. Brown, who, after a dose of opium or laudanum, always ordered his patients to be supplied with some strong and solid food, to prevent the debility, which would otherwise take place." (*Latta, Vol.* 3. *p.* 75.)

Dr. Rush, professor of medicine in Philadelphia, has lately published, in the Transactions of the American Philosophical Society, Vol. 2. a paper, intitled, "*Observations on the Cause and Cure of Tetanus.*" Dr. Rush, considers tetanus, as a disease occasioned by a relaxation, and, consequently, recommends for its

cure, such medicines, as are calculated to remove this relaxation, and to restore tone to the system. Hence, he advises the liberal use of wine, and Peruvian bark; and states, that he has put this plan in practice with success. When the disorder is the consequence of a wound, Dr. Rush recommends stimulants to the part affected: the wound is to be dilated, and filled with oil of turpentine.

In Spain, however, a very opposite mode is said to be adopted with great success: practitioners there advise the use of mild emollient applications to the wounded part, and, they, in particular recommend it to be immersed, for an hour in tepid oil, and to repeat this plan, at short intervals. In this manner, many cases are said to have been relieved, after very alarming appearances had taken place.

I shall now insert the truly valuable observations of the experienced M. Larrey upon the treatment of this disorder.

"Experience has proved (says this author) that when tetanus is altogether abandoned to the resources of nature, the individuals quickly perish. The practitioner, therefore, should hasten to fulfil, as much as possible, the indications, which this disease presents; the principal are, to remove the causes of irritation, and reestablish the suppressed excretions.

"The first is fulfilled by suitable incisions made in the wound before the symptoms of inflammation have come on; for, if this has made progress, the incisions would be useless and even dangerous. They should comprehend, as much as possible, all the nervous filaments, and membranous parts, which have suffered injury; but, incisions in the joints are pernicious, and appear, in all cases, to accelerate the symptoms of tetanus, as I have seen instances of.

"The application of caustics to the wound may be practised with advantage, on the first attack of the symptoms, the same precept being observed as in making incisions, these operations may be followed by bleeding, if necessary, and the use of topical emollients and anodynes, though their effect is generally very feeble.

"Internal remedies, whatever may be their properties, are almost always useless, because the patient, soon after the invasion of tetanus, falls into a state of strangulation; but, if such state only comes on towards the latter stage, and gradually, such remedies as have obtained the greatest confidence of practitioners may be employed, as, for instance, opium, camphor, musk, castoreum, and other antispasmodics, in strong doses, which are to be gradually increased. These means were used with some advantage for the patients, who were the subject of the annexed observations.

"A mameluke of Mourâd-bey, named Mustapha, 27 years of age, and of a dry bilious constitution, received, the 19th of April, 1800, a gunshot injury, by which the first phalanges of the fingers of his right hand, and the corresponding metacarpal bones, were broken in pieces, and the thumb shot away at the articulation with the trapezium: many tendons and ligaments were also torn and lacerated.

"Mourâd-bey had every possible care taken of him; but, as the remedies were administered, without the cause of the disease being understood, they could not fulfil the indication, which presented itself. It may therefore be said, that this individual continued without assistance, till the 18th of May, at which period Mourâd-bey, seeing the bad state of the patient, sent him to the French surgeons, with a recommendation to General Donzelot. M. Cellière, surgeon of the second class at the hospital of Syout, was directed by the general to take care of this mameluke.

"All the symptoms of tetanus had prevailed for three days; the suppuration of the wound was serous and in small quantity; its edges were red and puffed up; the muscles of the arm already contracted and in a state of convulsion; the jaws closed; deglutition attended with difficulty; and the patient constipated and restless.

"The first attention of M. Cellière was to dilate the wound, and carefully extract the loose splinters of bone: he applied emollient dressings, and gave the patient six grains of opium, joined with four of camphor. A few hours afterwards some relief was experienced, and the following night was less severe. The sleep, however, was interrupted by spasms in the wounded member, and the acute pains, which accompanied them; a perspiration took place in the upper half of the body; and the lower extremities continued in their ordinary state. This melioration induced the surgeon to go on with the same remedies, the doses of which were gradually increased. The symptoms by degrees diminished until the 24th of May, at which period the patient was moved from Syout to Minyet: the obstacles to deglutition were removed, and the excretions partly reestablished. The burning heat of the day, and the journey had fatigued him; and this circumstance, perhaps, together with the coolness of the night, to which he exposed himself in lying upon the terrace of the hospital, contributed to the reproduction of the symptoms of tetanus. The same means were continued, without keeping the disorder from advancing with its usual ra-

pidity. Warm bathing was tried: the second bath produced a general amendment, which enabled the patient to swallow the half of a potion, composed of eight grains of camphor, as much musk, and twenty grains of opium, dissolved in an emulsion: the other half was taken in the course of the day. Very soon afterwards, the pain diminished, the jaws became relaxed, and the sleep was tranquil. On the morning of the 19th of May, there was great improvement; the suppuration of the wound was reestablished; the organs by degrees resumed their functions, and a few days sufficed to bring this mameluke into the way of getting well, and the cure was completed by the most assiduous attention, and the varied use of remedies specified. Lastly, on the 29th of June, he was restored in perfect health to the General Mourâd-bey.

"At the battle of Aboukir, the general of division, Lannes, received a ball, which passed through the lower half of the leg, between the two bones. During the five first days, he was treated in his tent; but he was afterwards conveyed to Alexandria. Although he was carried in a covered carriage on springs, the journey was uneasy and extremely painful.

"On his arrival, he sent for me. I found him restless, and agitated, expressing the greatest apprehension of the consequences of his wound. The leg was swelled, and the wound dry and painful; he had spasms, the whole limb was affected with violent startings, and the foot was numbed. The voice was hoarse; the jaws much closed; the eyes haggard; and a good deal of fever prevailed.

"At his request, I left him alone, for some time, in order that he might sleep; but, he was soon roused by pain and general indisposition. I applied emollient dressings, and ordered cooling beverages, strict quietude, and a low diet.

"On my second visit, three hours afterwards, I found all the symptoms worse. I immediately had him bled in the arm, and prescribed for him emulsions, to which were added the nitrate of purified potassa, alcoholized sulphuric æther, some sirop of diacodium, and orange flower water, in suitable proportions, a glassful to be taken every quarter of an hour. The topical emollients were continued.

"The patient passed a bad night, and the next day he was in the same state, with the leg highly inflamed; he swallowed with difficulty, and the jaws were constantly closed. The bleeding was repeated, and I continued the same medicines, with the addition of antispasmodics.

"The following night was easy; the fever abated; and all the other symptoms diminished: the wound and the leg were relieved by an oozing of bloody matter; the spasms totally ceased; a healthy and copious suppuration took place; the excretions resumed their course, and, at the period, when I set off for Cairo, the patient was in a convalescent state. Soon afterwards, he was well enough to return to France with the general in chief Buonaparte.

"In consequence of such a wound, M. Croisier, aide-de-camp to the commander in chief, had perished of tetanus, in the deserts of Qatych, on our return from Syria.

"M. Estève, director-general of the public revenue in Egypt, was seized with a slight inflammatory quinsy, occasioned by the presence of a piece of fish-bone, which had lodged in one of the sinuses of the fauces: its smallness concealed it, notwithstanding every examination.

"On the 13th day after the accident, and the 3d from the time, when inflammation began, the symptoms of tetanus came on, such as a contraction of the jaws, convulsive motions of the muscles of the face, accompanied with violent pain, and rigidity of all the muscles of the throat; the pulse was nervous and accelerated; frequent catchings occurred in the upper extremities; the stools were suppressed; and there was considerable difficulty of speech and deglutition.

"The rapid progress of the symptoms made me tremble for the life of my friend; his death would have deprived us of an officer, whose talents and qualities all the army appreciated, and whom it regarded as a man of the highest integrity.

"I immediately prescribed for the patient a sweetened emulsion, to which I added the extract of opium, castoreum, camphor, the nitrate of purified potassa, and alcoholized sulphuric æther, in very strong but graduated doses, which were taken by glassfuls every quarter of an hour. The weak state of the pulse did not allow me to employ bleeding. I applied resolvent poultices to the forepart of the neck; I ordered the feet to be bathed in warm water; emollient clysters; the throat to be exposed to the vapour of a strong decoction of hyoscyamus, poppies, and marshmallows; dry frictions over the whole body; and I recommended the avoidance of every thing, which could tend to disturb the patient's rest. I observed regularly all the successive phenomena of the disease. The following night was attended with great agitation; the pain was violent; deglutition interrupted; the saliva flowed out of the mouth; and the jaw strongly closed. The patient suffered painful and incessant agitation; he fell for a short time into a comatose state, attended with slight attacks of de-

lirium; in short, every thing portended the most imminent danger. About four in the morning, however, a copious perspiration over the chest and abdomen, succeeded this violent paroxysm; the patient became easy, and was able to swallow some of the above emulsion. The second dose increased the perspiration, and relaxation of parts, and I was therefore led to think favourably of the effects of the medicine; for, when the perspiration is symptomatic, it begins upon the head and extremities; while, when it is critical, it occurs over the chest and abdomen. The next day, the jaws were quite relaxed, the deglutition was easy, and the contraction of the muscles materially diminished. I substituted for the resolvent cataplasms, volatile liniments, and for the emulsion, a bitter laxative mixture, in order to unload the bowels, and re-establish the tone of the stomach. A few days afterwards, M. Estève was quite cured.

"The fish-bone seemed to have been moved away by a slight suppuration, that took place in the fauces.

"I have remarked, that patients have less aversion to swallowing emulsions, than any other liquid. They are smoother and more agreeable, and facilitate the effect of the remedies, with which they are combined.

Frictions with oily liniments, as recommended by some authors, were tried at the hospital, No. 2, in Cairo; but, they produced no change in the state of the disease.

"Mercurial frictions have appeared to me to aggravate the symptoms in the patients, upon whom they were tried. In Egypt, the employment of this means, even for venereal complaints, requires the utmost precaution; for, when administered in this climate, as in Europe, it has occasioned the most afflicting consequences, idiotism, hepatic diseases, &c.

"Poultices, made of the leaves of tobacco, and applied to the wounds of persons labouring under tetanus, have been followed by no advantageous effect. The alkalies have also been tried in several tetanic cases, without success.

"The application of blisters to the throat, in cases of trismus, and especially in that of M. Navailh, have failed in arresting the symptoms.

"The moxa and actual cautery, recommended by the Father of Medicine, have been equally unavailing. The moxa was employed at Jaffa upon three wounded men; the disease notwithstanding followed its usual course, and terminated fatally.

"I have cited a striking instance of the inefficacy of the second method, in a case of opisthotonos.

"Although large wounds, like those which are produced by the amputation of a limb, or wounds with loss of substance, may be sometimes followed by tetanus, this does not prove, that amputation, which I propose for the relief of this disease, is dangerous, nor that it cannot have beneficial effects; especially, as it is easy for an attentive surgeon to prevent the cold damp air from coming into contact with the wound, as well as prevent the irritation arising from the presence of foreign bodies, and the suppression of the purulent discharge, which are (says M. Larrey) the common causes of tetanus, particularly in warm climates.

"This end may be accomplished by keeping the patient, as much as possible, in a very warm and equal temperature; by taking care to extract without delay all foreign substances, dress the wound tenderly, cover it immediately with fine linen, having slits cut in it, and not dress recent wounds until suppuration is well established. Lastly, a regimen, and quietude are to be enjoined.

"When tetanus is caused by the suppression of the discharge, blisters, applied as near as possible to the wound, or to the wound itself, re-excite suppuration, and put an end to the effects of this accident. I proceed to detail some instances of such success.

"Pierre Bonnet, of the 85th demi-brigade, aged 20 years, of a bilious and irritable constitution, lingered in the hospitals at Cairo, ever since the campaign in Syria, with a fistulous ulcer, attended with caries of the bones, which constitute the right ankle joint. In a clinical consultation, it was determined, in consideration of the diseased state of the foot, and the marasmus to which the patient was reduced, that amputation was the only means of saving his life. It was done on the 21st of September, by M. Valet, surgeon of the first class, who had the particular care of this patient.

"The success of the operation was interrupted by no accident. Suppuration occurred at the usual period, and the wound looked well. Ten days afterwards, the cicatrix began to form at the circumference, and gradually extend towards the centre.

"When the patient was just on the point of being well, (it was the 24th day from the operation) he was suddenly seized with symptoms of tetanus, which no doubt were excited by the suppression of the discharge.

"Perspiration was also obstructed, in consequence of the patient's imprudence in walking in the night-time. Diaphoretics, strong doses of opium, and dry frictions over the whole body, were employed, by my advice. The symptoms,

however, advanced with their wonted rapidity.

"The patient experienced strange pains in the epigastrium, and intolerable dragging sensations in the amputated member. Respiration was laborious; deglutition difficult; the jaws were closed; the head bent upon the chest; the trunk curved; and emprosthotonos prevailed in the highest degree.

"Opiates not passing any longer, anodyne and antispasmodic emulsions were given, through a vacuity, left by the loss of two of the incisor teeth: and these medicines at-first relieved the pain about the stomach. A large blister, applied to the whole circumference of the stump, reproduced suppuration in 24 hours, and occasioned a miliary eruption on the face and chest. From this moment, the patient was a great deal better; all the symptoms of tetanus gradually diminished; the functions were re-established, and, on the 50th day from the operation, this soldier was discharged from the hospital perfectly cured."

Monsieur Larrey next details a case, which is materially the same as the preceding, and I shall therefore omit it in this work.

"The equally unexpected and entire success (continues M. Larrey), obtained, by the amputation of the injured limb, in the person of an officer attacked with chronic tetanus, leads me to propose the question, *whether, in this disorder, occasioned by a wound of some part of the extremities, it would not be better to amputate the injured limb immediately the symptoms of tetanus commence, rather than expect from the resources of nature, and from very uncertain remedies, a cure, which so seldom happens?*

"If tetanus is chronic, as is sometimes observed, amputation may be done at every period of the disorder, provided a choice be made of the time, when there is an intermission of the symptoms. The operation would not answer so well in acute tetanus, if the disease were advanced, and the muscles to be divided were strongly contracted and rigid, as I have observed at the siege of Acre in a soldier, who was seized with tetanus, in consequence of a gun-shot wound of the left elbow.

"When I saw the patient, who makes the subject of this last observation, the symptoms were already advanced. However, I made the experiment of amputating the arm. The operation was followed by considerable ease, so that I had some hope of its success; but, not being able to shelter the patient from the coolness of the nights, and the tetanus having made too much progress, and being exceedingly acute, the symptoms recurred in a few hours afterwards, and the patient fell a victim on the third day from the operation.

"Without presuming to settle the important question, which has been proposed, I shall endeavour to offer some reasons, which appear to be in favour of amputation.

"When it is clear, that tetanus arises from the wound, we should not hesitate to amputate on the first access of the symptoms. We may certify ourselves, that the case is traumatic, by the nature of the wound, the progress of the early symptoms, and the period of their attack, which, at latest, is between the fifth and fifteenth day. When suppuration is established, the stupor quickly diminishes, the vessels unload themselves, the sloughs are detached, and the nerves enter into a state of perfect liberty. Then their sensibility is extreme, and from the slightest impressions, they are susceptible of a most violent irritation, which is rapidly propagated throughout the whole nervous system. If, in this circumstance, the wound is affected by a cold damp air, or if there should be present any foreign bodies, pricking the nervous parts now separated from the sloughs, tetanus is inevitable, especially, in warm climates. We must then expect to see the disorder make rapid advances, so that in a very short time, every part of the member is affected, and all the nerves suffering irritation. The effects of this first cause, may also be complicated with a bad habit, or with worms in the bowels, as I have seen an example of at Nice; but, by paying careful attention to the phenomena of tetanus, we may readily distinguish the symptoms, which characterize these slight complications, and combat them with the proper remedies.

"The section of the member, performed on the first access of the symptoms, interrupts all communication between the source of the disorder and the rest of the body. This division unloads the vessels, relieves the tension of the nerves, and puts an end to the convulsive motion of the muscles. These first effects are followed by a general relaxation, which promotes the excretions, and sleep, and re-establishes the equilibrium in every part of the body.

"The aggregate of the temporary pains, caused by the operation, cannot increase the existing irritation: besides, the sufferings of tetanus render those of the operation more supportable, and lessen their intensity, especially, when the principal nerves of the limb are strongly compressed.

"M. Bonichon, lieutenant in the 1st battalion of the 21st demi-brigade of light infantry, was admitted into the hospital, No. 1, October 7, 1798, for a gun-shot

wound of the left foot, that he met with at the battle of Sedment.

" The direction of the wound was obliquely from behind forwards, crossing the tarsus, several bones of which were broken; and the short extensor muscle of the toes, and the corresponding articular ligaments, lacerated. On his arrival at the hospital, however, the case did not have any unfavourable appearance; the first dressings were methodically applied; the wound was dilated, and some splinters extracted.

" The same evening, the patient became uneasy; his sleep was painful; he experienced in the wound acute pains, which continued to increase until he was visited in the morning; the edges of the wound appeared puffed up, and surrounded with a reddish circle; the discharge was suppressed; and the application of the dressings, though executed with tenderness, was exceedingly painful. The patient, in short, was affected with general indisposition.

" Cooling anodyne beverages, and the application of emollients to the wound, had no effect.

" On the 19th of October, the closure of the jaws began, and, by the 29th, all the symptoms of tetanus were manifest. The muscles of the injured limb were in a state of convulsive contraction; the abdominal parietes were drawn in; the deglutition obstructed; and the patient constipated.

" These symptoms continued regularly to increase, but, in a slow and gradual manner, as the tetanus became chronic. A dilatation of the wound was made, without delay, for the purpose of extracting some moveable splinters, which had escaped the first examinations. Opium was prescribed in suitable doses. This means appeared at first to lessen the symptoms, which subsided and recurred alternately; but these alterations were of short duration; and on November 2, 1798, the disease was at its highest pitch.

" All the muscles were in a state of convulsive contraction; the legs were stiff, and strongly bent upon the thighs; and these upon the pelvis. The parietes of the abdomen were drawn close against the vertebral column; the head bent upon the chest; the arm and forearm in a state of flexion; the jaws closed; and deglutition attended with difficulty. The pulse was small and nervous; the patient was reduced to a degree of extreme emaciation; his body was constantly covered with perspiration; and he suffered incessantly such violent pain, that he prayed for death as a desirable thing.

" After having in vain tried all the means, which the healing art offers in this sort of case, such as opiates in every form, even united with camphor and bark; lotions of cold water; solutions of opium to the wound; emollient cataplasms, and afterwards those of tobacco; after having, I say, tried all these remedies, I thought of amputating the limb. The despair of this unfortunate man, and the certain death, that awaited him, induced me, contrary to the advice of several military surgeons, who were consulted, to employ immediately this last resource. Advantage was taken of an interval of ease, which occurred the same day. The operation was dexterously performed in my presence, and before all the surgeons consulted, by M. Assalini, surgeon of the first class. The patient, who was desirous of having it done, behaved courageously, and without betraying signs of great suffering. A slight syncope, which happened very soon after the operation, was the forerunner of the cessation of the symptoms. In short, a general melioration occurred, which allowed the patient to swallow some liquids. The following night was easy, and the patient had three hours of sound sleep. The next day, I found his pulse stronger, the limbs less rigid; the jaws relaxed; and some stools had already come away, with the aid of clysters. At the ordinary period, suppuration took place and all the symptoms gradually subsided. The stump, however, was affected, for several days, with violent spasms, which were increased by the slightest touch of any thing externally and, particularly, on applying the dressings, notwithstanding every care taken not to irritate the parts. I succeeded in assuaging these spasms by making an exact compression along the course of the sciatic nerve.

" The strength returned very quickly; but, the digestive organs were a long time affected with atony, (as M. Larrey thinks) by reason of the pressure, which the parietes of the abdomen had made upon them.

" Towards the end of the following December, however, this officer left the hospital quite well, beginning to walk about on his wooden leg. Soon afterwards, he returned to France, with some discharged blind soldiers, and he must be at the Hotel des Invalides at Paris.

" The battle of the 21st of March, 1801, gave me occasion to amputate a soldier's leg, for an injury similar to that of M. Bonichon. Although tetanus had begun, and was of the acute kind, the operation stopped all the symptoms as it were, by enchantment; and, doubtless, if it had not been for the dampness of the ward, where the patient lay, and the want of proper means for keeping him from the

coolness of the nights, this operation would have been equally successful. He passed about twelve hours in perfect ease; but, the coldness of the following night, (which was greater than usual) reproduced the symptoms. These resisted all the proper remedies, and the patient died on the third day from the operation.

"The general of division, Destaing, received in the same battle a ball, which went through the middle internal and back part of his right arm. A portion of the biceps, coraco-brachialis, and the radial and internal cutaneous nerves, were divided. Between the two openings, there was an intervening mass of soft parts, consisting of integuments, cellular substance, and some muscular fibres. The first effects of this injury were, the fall of the sabre from the general's hand, paralysis of the arm, and a painful trembling, which immediately affected the whole limb, attended with anguish, general debility, and oppression of the organs of respiration.

"It was with difficulty, that the general was conveyed to Alexandria, where he first received the succour of one of my colleagues. I was not consulted till the 8th day, at which time his pains were beginning to be extremely acute. Although suppuration had taken place, the patient's appetite was disordered, his sleep broken, and in the evening febrile symptoms came on. I immediately saw the necessity of dividing the parts between the two orifices where there were some filaments of the internal cutaneous nerve; but, as the patient would not consent to this slight operation, I was obliged to be content with applying emollients, and prescribing proper internal remedies. I dressed the wound daily, and continued to do so till the cure was finished. The next day, the local pains were more acute. There were convulsive motions in the hand and forearm, heat all over the body, and a closure of the jaws. The patient was very restless and in continual agitation. The rapid progress of the symptoms led me to divide the parts between the two orifices, and to make an incision through the bottom of the wound, where some nervous and aponeurotic fibres lay.

"This operation was painful; but, two hours afterwards, the patient felt much relieved. With the assistance of anodyne emulsions, emollient clysters, rest, and diet, all the symptoms subsided in the course of two days. The suppuration became healthy, the wound put on a clean appearance, the swelling of the edges disappeared, and, at the conclusion of the siege of Alexandria, the cicatrization was completed.

"This wound left the forearm and hand affected with paralysis: the two last fingers also continued senseless for a long while.

"Although (says M. Larrey) I have to regret not having more examples of cures effected by amputation, I have a sufficiency to conclude:

"1. That of all the remedies, advised by skilful practitioners, experience has convinced me, that the extract of opium, combined with camphor, and the nitrate of purified potassa, dissolved in a small quantity of emulsion, made with sweet almonds, and given in doses more or less strong, acts the most favourably, since patients, who have an aversion to other fluids, take with pleasure this mixture, the effects of which must be promoted by bleeding, if indicated, and blisters under the circumstances, which have been specified.

"2. That amputation, done at a proper time, is the most certain means of arresting and destroying the effects of tetanus, when it depends upon a wound situated in the extremities." (See *Larrey's Mémoires de Chirurgie Militaire, Tom. 1, sur le tetanus traumatique, p 235, &c.*)

Having now touched upon all the different modes of treating tetanus, it only remains for me to remark, that, among such diversity of practice, it is difficult to pronounce, in positive terms, which method claims the preference. Comparative trials, faithfully and impartially made, can alone enable us to form an accurate judgment. As the disease is not common in this country, the experience of individuals, concerning it, cannot be extensive enough for this purpose. Medical practitioners, in our settlements abroad, have the best opportunities of undertaking the investigation. From all, that I have read, I conceive, that facts prevail in favour of the following plans, in the order set down. 1. Removal of the wounded part and exhibition of opium, camphor, musk, castoreum, and other antispasmodics in large doses. 2. Cold bathing and opium. 3. Cold bathing, and strong stimulants, such as volatile alkali, brandy, wine, and spices, with bark. 4. Mercurial frictions, practised so as quickly to induce a salivation.

The reader may find some cases, or interesting matter, in *Hippocrates de Morb. Popularibus, lib. 5 et 7. Aretæi et Galeni Opera. Cælius Aurelianus de Morbis Acutis. Med. Obs. and Inq. Vol. 1, p. 1 and 87; Vol. 6, p. 143; and in Hillary on the Air and Diseases of Barbadoes. Edinburgh Physical and Literary Essays, Vol. 3.* In this last work, Dr. D. Monro describes the mode of cure by salivation, as successfully practised by a gentleman in Jamaica. In *Medical Transactions*, Dr. Carter relates a case, which yielded to a blis-

ter, applied between the shoulders the whole length of the spine, rubbing the jaw with the *oleum lateritium*, and repeating the following purge, at intervals of three, or four days: ℞. *Tinct. Sacræ* ℥ij. *Tinct. Jalap.* ℥j. *Syr. è spinâ Cerv.* ℥ss. *M. fiat haust. purg.* On the intermediate days, the *oleum succini*, the fetid gum, and *ol. amygdal.* were exhibited. Of the first, the patient took thirty drops; of the gum twenty grains; and of the *ol. amygdal.* four ounces; in twenty-four hours. Dr. Cochrane first represented the advantages of the cold bath in the *Edinburgh Medical Commentaries*; a plan, which was afterwards more fully explained by Dr. Wright, in the *Medical Observations and Inquiries, Vol.* 6. Dr. Currie, of Liverpool, used the cold bath with success, and his name should not be omitted, in favour of what seems one of the most efficacious measures in tetanus.

The reader should also consult *Cullen's First Lines of the Practice of Physic, Vol.* 3. *Rush's Observations on the Cause and Cure of Tetanus, in the second volume of the Transactions of the American Philosophical Society. Latta's System of Surgery, Vol.* 3. *Larrey, in Mémoires de Chirurgie Militaire, Tom.* 1, *p.* 235, *&c. and Tom.* 3, *p.* 286, *&c.*

THERIOMA. (from Θηριοω, to rage, like a wild beast.) A malignant ulcer.

THERMÆ. (from Θερμος, warm.) Mineral warm baths.

THORAX. (*The Chest.*) The term, *thorax*, is said to be derived from the Greek verb, Θωρεω, to leap, because the heart leaps, or pulsates in it.

In the language of anatomy, the thorax implies the upper part of the trunk, or that portion of the body, which is surrounded by the sternum, the ribs, and the dorsal vertebræ.

The chest is subject to different kinds of injuries, produced by external causes, and the important nature of the organs, which it contains, renders the consideration of such cases of the highest consequence to the practitioner. In speaking of *Fractures of the Ribs, Emphysema, Paracentesis of the Thorax, &c.* an account has already been offered, of some affections of the thorax, which are very essential to be known by every surgeon. In the present article, we intend to treat of the subject of wounds, interesting this part of the body; but, before beginning what we have to say, concerning these cases, it seems proper to remind the reader of some anatomical circumstances, relative to the thoracic viscera.

The thorax is a very large cavity, of an irregularly oval figure, bounded in front by the sternum, laterally by the ribs, posteriorly by the vertebræ of the back, above by the clavicles, and below by the diaphragm, a very powerful muscle, which forms a kind of partition between the cavity of the thorax, and that of the abdomen.

The diaphragm is not stretched across, in a straight direction, from one side of the chest to the other; but, on the contrary, descends much further in some places, than in others. If the cavity of the thorax be opened, by a transverse section, about the middle of the sternum, the diaphragm appears, on examination, to be very prominent and convex towards its centre, while it sinks downward at its edges, towards all the points, to which the muscle is attached. At its anterior, and most elevated part, it is fixed to the ensiform cartilage, whence, descending obliquely to the right and left, it is inserted, on both sides, into the seventh rib, to all the lower ribs, and, lastly, to the lower dorsal vertebræ. According to this description, it is obvious, that the cavity of the thorax has much greater depth and capacity behind, than before; a circumstance, which surgeons ought to be well aware of, or else they will be very apt to give most erroneous opinions, concerning such wounds as happen to the chest. For instance, a practitioner, deficient in anatomical knowledge, might imagine, that a weapon struck from above downward, into the front of the chest, could never reach the lungs, after having penetrated the cavity of the abdomen. It is a fact, however, that no instrument could be pushed in this direction, even some inches below the highest part of the abdomen, without entering into the cavity of the chest.

The whole cavity of the thorax is lined by a membrane, named the pleura, which is every where adherent to the bones, which form the parietes of this cavity, and to the diaphragm. Each side of the thorax has a distinct pleura. The two membranes meet in the middle of the chest, and extend from the sternum to the vertebræ. In this manner, two cavities are formed, which have no sort of communication with each other. The way, in which the two pleuræ touch, and lie against each other, forms a middle partition, which is called the mediastinum. These two membranes are intimately adherent to each other, in front, the whole length of the sternum; but, behind, where they approach the vertebræ, they separate from each other, so as to leave room for the passage of the aorta, œsophagus, &c. The heart, enclosed in its pericardium, occupies a considerable space on the left of the mediastinum, all the rest of the cavity of the chest being filled with the lungs, except behind, where the large blood-vessels, nerves, thoracic duct, and œsopha-

gus, are situated. In the perfectly healthy state, the lungs do not adhere to the pleura; but, in this climate, at least, the majority of subjects, which are examined after death, are found to have such adhesions in different places. The disease may probably be occasioned by a very slight inflammation in the chest; and, as the surface of the lungs is naturally destined to be always in close contact with the pleura, and patients are frequently not suspected to have any thing wrong in the thorax, this morbid change being often accidentally discovered after death, in looking for something else; we may conclude, that it does not occasion any inconveniences.

The thorax is subject to all kinds of wounds; but, the importance of these injuries most particularly depends on the depth, to which they extend. Such as do not reach beyond the integuments, do not differ from common wounds, and, when properly treated, are seldom followed by any bad consequences. On the contrary, those which penetrate the cavity of the pleura, even by the slightest opening, are apt to occasion, in some circumstances, the most alarming symptoms. Lastly, such wounds, as injure any of the thoracic viscera, are always to be considered, as placing the patient in a state of considerable danger.

From what has been said, it appears, that wounds of the thorax are very properly divisible into three kinds: viz. 1. such as only affect the skin, and muscles; 2. such as enter the cavity of the chest, but injure none of the viscera; 3. others, which injure the lungs, or some other viscus.

SUPERFICIAL WOUNDS OF THE THORAX.

Immediately a surgeon is called to a recent wound of the chest, his first care should be to endeavour to ascertain, whether the weapon has penetrated the chest, or not. An opinion may be formed on this subject, by attending to several circumstances. 1. Surgical writers recommend, for this purpose, placing the wounded person in the same posture, in which he was, when he received the wound, and then carefully examining with a finger, or probe, the direction, and depth of the wound. 2. We are also advised, if possible, to get the weapon, with which the injury was inflicted, and, by the bloody part, judge how far it has penetrated. 3. We are advised to inject some liquid into the orifice of the wound, and to observe, whether it regurgitates immediately, or lodges in the part. 4. The colour and quantity of the blood, emitted from the wound, are to be noticed, and whether any is coughed up. 5. We are to examine, whether the circumference of the wound becomes emphysematous, or any air escapes from its orifice in respiration. 6. Lastly, the state of the pulse and breathing is to be attended to.

It is a general precept, that, in order to examine a wound in the best manner, the patient should be put, as nearly as possible, in the same posture, as he was in at the moment of meeting with the accident; but, it is very essential, that this precaution should not be neglected, in examining a wound of the chest. The great number of muscles, which surround this part, and the continual motion of the ribs, may make a wound appear, in one position of the body, quite superficial, while, in another posture, it shall be found to extend to a great depth. For, should any part of a rib, or even any of the cellular substance, in consequence of the patient's posture, become situated in the track of the wound, neither the finger, the probe, nor an injection, will pass with sufficient ease to make a proper examination.

Sometimes, the orifice of the wound is so large, that one can easily distinguish with the eye, whether the injury penetrates into the cavity of the thorax, or not; or, one can introduce a finger, which, when this can be used, without bruising, or tearing the parts, is always preferable to any probe. But, when the smallness of the opening prohibits the employment of the finger, we are necessitated to make use of a probe; and the best instrument, of this kind, is in this case a bougie, which is not so apt as a silver probe, to pierce parts, which have not been wounded. However, a prudent, and experienced, practitioner will seldom do any mischief of this sort, whether he uses one instrument, or the other.

In treating of wounds of the abdomen, I have cautioned surgeons against being too officious in probing such injuries, merely, for the sake of gratifying their own curiosity. The same advice is equally applicable to the present cases. Surgical authors have, perhaps, dwelt too much on the subject of probing wounds of the abdomen, and thorax, and their readers imbibe an opinion, that, until they have traced the wound, with their finger, or probe, to its very bottom, and termination, they are not qualified to put in practice any kind of measures. The only advantage of knowing, that a wound penetrates the chest, is that the practitioner immediately feels himself justified in having recourse to bleeding and other antiphlogistic means, and thus averts inflammation of the pleura, and lungs, which affection, when it has made progress, often proves fatal. However, there can be little doubt, that if the nature and depth of

the wound cannot be readily detected, with the eye, the finger, or a probe, it is much safer to bleed the patient, than to put him to useless pain, irritate the injury with the introduction of instruments, and waste opportunities of doing good, which can often never be recalled. In short, it is better, and more advantageous, for all patients, that some of them should lose blood, perhaps, unnecessarily, than that any of them should die, in consequence of the evacuation being omitted, or delayed.

Almost all the writers, who have taken pains in directing, how wounds of the thorax should be probed, conclude with remarking, that, however advantageous a knowledge of the direction and depth of the wound may be, much harm has frequently been done by pushing the attempts to gain such information too far. It is, perhaps, of greater importance to ascertain, by some kind of examination, the extent of a wound, which does not reach beyond the integuments, or intercostals, than to know, whether the wound extends into the cavity of the chest. For, even when the pleura is found to be divided, if the wound is attended with no urgent symptoms, the information is of no practical use, if we make it a rule to adopt, without the least delay, a strict antiphlogistic plan of treatment, in all cases, in which there is any doubt, or chance of the parts, within the chest, being wounded, and likely to inflame. Besides, very frequently, the symptoms are more urgent and alarming, than they could be, were only parts on the outside of the thorax injured; and, in these instances, it is obvious, that the employment of a probe cannot be necessary for discovering, that the wound extends into the chest.

We have above adverted to inspecting the weapon, with which the wound was inflicted, as a mode of gaining some information, concerning the probable depth of the wound. Enquiry may also be made, in what direction it was pushed: and, sometimes, the blood on the instrument will denote how deeply it penetrated. It is clear, however, that though information of this kind may be obtained, in a few instances, in general, it is otherwise.

When, by any of the above means, it cannot be learnt, whether the wound penetrates the chest, or not, various authors recommend the injection of luke-warm water. If the water regurgitates at once, they conclude, that the injury is only superficial; but, when the fluid, either wholly, or in part, continues in the wound, without producing any external swelling, they infer with certainty, that an opening has been made in the pleura. This plan of examining the state of parts, however, is much more objectionable, than the employment of a probe; for, if the liquid be propelled, with a certain degree of force, for the purpose of driving it to the bottom of the wound, parts, which were not before hurt, will in this manner become injured. The fluid may also be injected into the cavities of the cellular substance, and may seem to be passing through the track of the wound into the chest, while, in reality, not a drop does so. Besides, is it a warrantable proceeding to try to insinuate any quantity, or kind, of liquid, whatever, between the pleura and lungs, into a situation, in which it must necessarily obstruct the important function of respiration, and cause serious inconvenience?

When air issues from the wound in expiration, there is ground for suspecting, that the lungs are wounded. But, authors have erred in setting down this circumstance, as an infallible criterion of the nature of the accident; for, the same symptom may happen, when there is only an opening made into the chest, without any injury of the lungs whatever. The air, which is expelled in expiration, has previously got into the bag of the pleura through the wound, in inspiration. In such cases, the external air insinuates itself, through the opening into the chest, between the pleura and lungs, and, it will be seen to escape, during expiration, although the lungs may not be at all wounded. In order to remove all doubt upon this subject, the patient should be requested to expire, as strongly as he can, so as to force out whatever air may have accumulated in the chest. At the end of each expiration of this kind, care must be taken to bring the skin closely over the orifice of the wound, and to keep it thus applied, during each following inspiration, for the purpose of preventing the external air from entering. In this way, if there be no wound of the lung, all the air will soon be expelled; but, when some still continues to come out in expiration, we may conclude, with certainty, that the lungs are wounded.

Sometimes, an emphysematous swelling takes place round wounds of the thorax, in consequence of a quantity of air diffusing itself in the cellular substance. This symptom is very uncommon in wounds, which are straight, and ample; but, it is by no means, unfrequent, in wounds caused by narrow stabs, more especially oblique ones, and by the points of broken ribs. (See *Emphysema.*) When a considerable quantity of blood flows from a wound of the chest, there is great cause for conjecturing, not only, that it has penetrated the cavity of the thorax, but, also, that some of the thoracic viscera are injured. Excepting the intercostal arte-

ries, which run along the lower edges of the ribs, and the trunk of the thoracic arteries, all the other vessels, on the outside of the chest, are very inconsiderable. A proper compression will soon shew, whether the blood escapes from an artery on the outside of the cavity of the pleura. The situation, and direction of wounds very frequently denote at once, that the hemorrhage cannot proceed from any of the trunks of the thoracic arteries.

Even the appearance of the blood, which comes from the wound, may lead to some conjectures, concerning the depth of the injury. The blood, which flows from wounds of the lungs, is of a brighter scarlet colour, and more frothy, than that which is emitted from any other part.

There can be no doubt of the lungs being wounded, when the patient is observed to spit up blood; but, the absence of this symptom is, by no means, to be regarded as a proof of the contrary.

The state of the pulse, and that of respiration, ought to be particularly attended to by the practitioner. Neither one, nor the other, seems altered, at least at first, when wounds do not reach more deeply, than the integuments; but, those, which penetrate the cavity of the thorax, and, especially, such as injure any of the viscera, may frequently be distinguished, from the very first moment of their occurrence, by their effects on the sanguiferous system, and the function of respiration. When the lungs happen to be wounded, at a place where they have contracted an adhesion to the pleura, the wound may extend to a great depth, and yet no air may be diffused in the cavity of the thorax, nor the functions of these organs be at all disturbed. But, when either air, or blood, has insinuated itself between the lungs and the pleura, the lungs become immediately oppressed, the breathing is attended with difficulty, the pulse is weak, contracted, and intermittent; and no doubt can be entertained, concerning the nature of the injury.

Having said enough, relative to the diagnosis of wounds of the thorax, we shall next consider their treatment.

Wounds of the thorax, which only injure the integuments, are not generally attended with any danger; they heal with the same readiness, and by the same means, as common, superficial, wounds in any other part of the body.

But, when the surgeon has to treat a punctured, or a gun-shot wound, it is too frequently directed, by writers on surgery, to lay open the track of the injury, from one end to the other with a knife, if its course should not be too extensive, and then to dress the cavity down to the bottom. Such authors also add, that when the track of the wound is so extensive, as not to admit of this plan, it is better to introduce a seton through it. Their object, in employing these methods, is to prevent the outer part of the wound from healing too soon, and thus give time for the whole of it to heal in an equal degree. Afterwards, they advise the silk of the seton to be gradually diminished, and, when, at length, the whole of it is removed, a slight degree of compression, kept up for a few days, is deemed sufficient for the completion of the cure.

The French surgeons have the discredit of bringing setons into fashion in this branch of surgery, and I am particularly glad, than an able modern writer has exposed the absurdity of the practice. "We find (says Mr. John Bell) the history of it, to be plainly this: that as Guy de Chauliac, Paré, and all the older surgeons, did not know how to dilate gun-shot wounds, they found these same setons useful in bringing the eschar sooner away, and in preserving an open wound; and, as they believed the wounds to be poisoned, they took the opportunity of conducting, by these setons, whatever acrid medicines might, according to the prevailing doctrines of that time, have any chance of correcting the poison." Mr. J. Bell notices, how surprising it is to see the cruelty, and perseverance, with which some modern practitioners, particularly, French, draw these cords through wounded limbs; and when the roughness of such a cord, or the acrimony of the drugs conveyed by it, produces a copious suppuration, these men are delighted with such proofs of their success. The setons have been introduced by the French surgeons, across the thickest parts of the limbs, along the whole length of the fore-arm, and, at the same time, frequently through the wrist-joint. The setons have also been covered with stimulating applications. Profuse suppurations, and dreadful swellings of course ensued; still, as Mr. J. Bell has remarked, these cruelties were continued, till the wound healed almost in spite of the pain; or till the coming on of very dreadful pain, great suppurations, convulsions, &c. made the surgeon discontinue the method, or even amputate the limb. The French have become so familiarized to setons, that they do not restrict their use to flesh wounds, they pass them quite across the thorax, across the abdomen, and even through wounds of the knee-joint.

When we wish to excite inflammation, in the cavity of the tunica vaginalis, for the purpose of radically curing a hydrocele, we either pass a seton through the part; lay it open with an extensive incision; cram a tent into it; or inject some irritating fluid into it. While the animal machine continues the same, says Mr.

John Bell, the same stimuli will produce the same effects, and a seton, injection, or long tent, if they produce pain and inflammation in the scrotum, will not be easy in the chest; and, unless we can use them in the chest, with the same intentions, with which we use them in the hydrocele, (in other words) unless we are justified in inflaming the chest, and causing an adhesion of all the parts, we cannot use them, with any consistency, or good sense.

With regard to the cases, which the French adduce in confirmation of the good effects of their plans, I am entirely of opinion with Mr. J. Bell, that the facts only prove, that *the patients recovered in spite of the setons.* "It is like (adds this author) what happened to a surgeon, who was dabbling in the thorax with a piece of caustic, which fell directly into the cavity of the chest, where it caused very large suppurations, and yet the patient was saved. The patient recovered, in spite of the caustic, just as M. Guerin's patient, and many other poor unhappy souls, who lived in spite of the setons. One would think, that people took a pleasure in passing setons across the eye-ball, the chest, the knee-joint, &c. merely to make fools stare, when the business might be as effectually done with an abscess lancet."

Mr. John Bell, in his usual lively style, makes the employment of tents, in wounds of the chest, seem equally ridiculous and improper. Indeed, he says, *he knows of no occasion in all surgery, in which tents can be useful, except in the single one of a narrow opening, which we desire to dilate, in order to get at the bottom of the wound; and where either, on account of some great artery, or the fearful temper of our patient, we dare not use the knife.* (*See J. Bell on Wounds. Discourse* 2, *Vol.* 2.)

Having hitherto been engaged, rather in pointing out, what ought not to be done, than what ought, I shall next make some remarks on the line of conduct, which should be adopted, in cases of wounds of the parietes of the chest.

When the wound is a common cut, the sides of the division are to be brought into contact, and maintained in this position, by the aid of strips of adhesive plaster, compresses, and a bandage, until they have grown together. There will very seldom be any occasion to employ sutures in these instances, if the surgeon only observe to relax such muscles as happen to be cut, or to be situated immediately under the wound of the integuments.

As cut wounds seldom, or never penetrate the chest, and there is generally no reason, why they should not unite by the first intention, without being followed by extensive inflammation and abscesses, only a moderate use of antiphlogistic means will usually be necessary. Bleeding will not often be requisite. The grand objects are, to keep the patient in a quiet state, on rather low diet, and to hinder him from taking wine, porter, spirits, or any stimulating beverages.

If the wound, instead of healing favourably, should inflame, the treatment should be regulated by the principles laid down in the article *Inflammation.* If it should suppurate over its whole surface, still the sides should generally be kept approximated by one, or two strips of sticking plaster; for, in this way, the cavity, which must now be filled up by granulations, will be rendered much smaller, than it otherwise would be. The softest particles of lint may be laid in the cavity of the wound, which the sticking plaster does not entirely remove, and over the whole a pledget of some mild, unirritating ointment. No pressure is now proper, until the inflammation diminishes; and if the matter should be very copious, attended with much surrounding inflammation, the best application would then be an emollient poultice. The patient should also be bled, and leeches should be applied, as often as necessary, round the wounded part.

When the case is a stab, or punctured wound, the fibres of the divided parts are not simply cut, they are also considerably stretched, bruised, and otherwise injured. Hence, they cannot, in general, be expected to admit so readily of being united, as the sides of a clean incision, made with a sharp instrument. However, the possibility of uniting the opposite sides of punctured wounds must depend very much on the shape of the weapon, and the suddenness, roughness, and violence, with which it was driven into the part. A prick with a needle is a punctured wound; so is that so often made by surgeons with their lancets; yet, these injuries do not so frequently bring on violent inflammation, and abscesses, as those wounds often do, which are inflicted with bayonets, and pikes.

Let us suppose a man has received a thrust of a bayonet, which has run into the skin and muscles, covering one side of the thorax; what plan can the surgeon follow, with the greatest advantage to his patient?

Instead of laying open the whole track of such a wound with a knife, as is barbarously recommended in many of the principal works on surgery; instead of drawing a seton through its whole course, or of cramming into the part, a hard, irritating tent; the practitioner should take whatever chance there is of uniting the wound without suppuration. For

this purpose, he should recollect, that the great degree of violence, done to the parts in punctured wounds, is the reason, why they are so apt to inflame and suppurate. Hence, the expected inflammation is (to use a vulgar expression) to be knocked on the head, if possible, on the very first instance; and immediately the wound is dressed, the patient should be freely bled, and take some saline purgative medicines. With regard to the dressings, the orifice of the wound may be closed with sticking plaster, if the circumstance is practicable; if not, it may be covered with any mild superficial applications. Over the track of the stab, a compress should be placed, and over this a common roller applied with some degree of tightness. Thus, the sides of the wound will be kept, as much as possible, in universal contact; the chance of union by the first intention taken; and all painful operations avoided.

If strict antiphlogistic means, and pressure, are thus put in practice, many stabs unite without abscesses, when surgeons entertain little hope of such success.

But supposing, that suppuration follows, and a collection of matter takes place, will the patient suffer more, or be put into greater danger, by having a proper depending opening, of just sufficient size, now made into the abscess at a proper place, than if he had submitted to have the formidable operation of laying open the whole extent of a stab, performed in the first instance. In short, will he suffer half so much, be half so long in getting well, or have to encounter half the danger? With all this advantage, he will have taken a certain chance, which attends all these cases, of the wound becoming united by, what is called, the first intention, that is to say, without any suppuration. I need not enlarge upon this subject, but refer the reader to *Punctured Wounds* in the article *Wounds*, and to the treatment of abscesses, in the article *Suppuration*. Gun-shot wounds, only injuring the parietes of the chest, are to be treated, according to the principles explained in the article *Gun-shot Wounds*.

OF WOUNDS PENETRATING THE CAVITY OF THE THORAX.

Wounds, which penetrate the chest, are always dangerous, and, consequently, claim the utmost attention of the practitioner. We shall first treat of such wounds, as enter the cavity of the thorax, but without injuring any of the viscera.

In the healthy state, the lungs so completely fill the cavity of the thorax, that, both in inspiration and expiration, they are always in close contact with the pleura; and, whenever air, blood, or any other matter, insinuates itself, between the outer surface of the lungs, and the inner one of the pleura, more or less oppression, and difficulty, of breathing immediately take place. In all wounds, attended with a division of the pleura, occurring in a situation, where there happens to be no adhesion between this membrane and the lungs, some of the external air, or a small quantity of blood, or both, can hardly fail to get into the cavity of the thorax. If one of the intercostal arteries should be wounded, and the external wound be, at the same time, very narrow, the blood, furnished by this vessel, is very apt to insinuate itself inwardly into the chest, and immediately occasion an immense oppression of the breathing, and other symptoms of pressure on the lungs. Of what is to be done in this case, we shall presently speak.

When a wound is known to have entered the pleura, and there is no symptom leading to a suspicion, that the lungs, or any large vessel, is wounded, the injury is to be dressed according to common principles, and the more superficially the better. Authors also usually direct us, just before we close the opening, to tell the patient to make a deep inspiration, for the purpose of expelling as much of the air as possible, which may have got into the cavity of the pleura. At the end of such inspiration, the edges of the wound in the skin are to be brought together, and kept so, with sticking plaster compresses, and a roller, applied round the body. The other grand indications, in the treatment, are to avert inflammation of the pleura and lungs, by a rigorous adoption of the antiphlogistic plan, copious bleeding, in particular, not being forgotten.

Let us now consider such wounds as penetrate the chest, and are complicated with some of the following circumstances: 1. With the presence of foreign bodies. 2. With injury of one of the intercostal arteries. 3. With a protrusion of a portion of the lungs. 4. With a considerable emphysema. 5. With an extravasation of blood in the thorax.

1. Almost all wounds, which penetrate the chest, occasion pain and difficulty of breathing. Many of them are also followed by an emphysematous swelling round the wound; the patient is frequently attacked by a spitting of blood; and, after having had, for some time, a small contracted, irregular pulse, with a pallid countenance, and cold extremities, he is too often seized with febrile symptoms. These should be counteracted by bleeding, diluent beverages, a proper regimen,

quietude, and external applications of the resolvent kind. If such symptoms should continue longer, than the first few days, without any diminution, writers inform us, that there is ground for suspecting, that they depend upon the presence of some foreign body. However, it may be doubted, whether Sabatier's advice, immediately to make search after the extraneous substance, is proper, under these circumstances. For my own part, I cannot think the symptoms, above related, by any means unequivocal, and even were they so, the practice would still be questionable. (See *Médecine Opératoire*, *tom.* 2. *p.* 244.)

M. Sabatier has quoted the two following cases, for the purpose of shewing what may be attempted in these cases.—"A man, twenty-seven years of age, was struck very violently with a knife, on the outer part of the fourth true rib. Simple dressings were applied for the first few days; but, a considerable coughing, and spitting of blood ensuing, M. Gerard was consulted. This gentleman found, that the symptoms depended, on the presence of a piece of the blade of the knife, which pierced the rib, and projected, to the extent of about six lines, into the cavity of the thorax. So little of the foreign body was on the outside of the rib, and it was so fixed in the bone, that it could neither be extracted with any kind of forceps, nor even moved in the least with a leaden mallet, &c. Although, in these urgent circumstances, there seemed to be no other resource, except that of sawing, or cutting out the portion of the rib, M. Gerard, however, thought, that an attempt might first be made to extract the foreign body, by pushing it from within outward. For this purpose, having put a steel thimble on his index finger, he introduced it into the cavity of the thorax, and thus succeeded in pushing out the piece of the knife.

The foreign body being taken out, M. Gerard next introduced his finger, without the needle, for the purpose of examining, whether the inner surface of the rib was not splintered. A spicula of the bone was in fact detected, capable of pricking the parts within the chest; but, it was too firmly connected with the rest of the rib to admit of being completely taken out. Hence, M. Gerard adopted the plan of making the splintered piece of bone continue in close contact with the main portion, by immediately surrounding the whole rib, at the splintered part, with a ligature. This was passed by means of a curved needle, and firmly tied over a thick compress. To these ingenious proceedings, as the French term them, was imputed, not only the cessation of all the bad symptoms, but a speedy recovery. (See *M. de la Faye's Notes to the Traité des Opérations de Dionis.*)

M. Sabatier quotes another case, which we next insert in this Dictionary, for the information of the reader.

An officer was shot in the left side of the chest. The ball entered about where the bone, and cartilage of the seventh true rib unite, and came out in the situation of the angle of the same bone, which was broken in two places. The neighbouring part of the first false rib was also broken behind. Incisions were made, which enabled the surgeon to take away several splinters of bone, and facilitated, (that absurd French practice) the introduction of a seton. Soft mild dressings were put on the wounds. In consequence of the dangerous nature of the accident, the patient was bled twenty-six times, with a view of relieving the fever, difficulty of breathing, and spitting of blood. On the fifth day, suppuration had begun to take place, and the seton could be easily drawn. In about a fortnight, the patient experienced a considerable abatement of his sufferings, and passed some of the ensuing days in a tolerably easy state. Circumstances having made it necessary to move him to another place, on the twenty-fourth day, he had an uneasy night: febrile symptoms took place, and the discharge was not of its usual consistence. Two more bleedings were practised, and the critical state of the patient led the surgeon to examine the wounds again. On passing a finger into the wound, which was situated behind, a foreign body was felt, and easily extracted. It proved to be a piece of the patient's coat. A spicula of bone was also felt more deeply lodged, which required the posterior wound to be dilated for its extraction. Some amendment followed the removal of these extraneous substances.

On the thirtieth day from the receipt of the wound, the bad symptoms having come on again, two more bleedings were practised, and, *as fear was entertained, that the seton did harm*, it was suppressed. The patient now first made complaint of feeling something, which pricked him, in a deep situation, between the two openings of the wound. It was found impracticable to ascertain the cause of this sensation, without dividing all that intervened, between the two wounds, and which formed a space of seven or eight finger-breadths. This serious operation was resolved on in a consultation, and M. Guerin set about it by cutting from within outward, the parts between the two ribs, with the aid of a finger introduced into the pos-

terior wound. Care was taken not to cut near the lower edge of the upper rib. In this way, the whole track of the ball was laid open, and, in the middle of it, a very sharp splinter was found, sticking in the substance of the lungs. This was removed, and the wound dressed with simple applications. From this day all the bad symptoms ceased, and the cure was completed at the end of four months. (*Obs. de Guerin in Mem. de l' Acad. de Chirurgie, tom.* 2; 4*to.*)

Mr. John Bell has taken notice of the preceding case: he observes, that some of M. Guerin's steps were bold and good, as well as successful; but, that the employment of the seton was wrong. The example teaches us several important circumstances: 1. The propriety of making very free dilatations for the extraction of splintered pieces of bone. 2. The utility of repeated copious bleedings, which, in the above case, indeed, had the greatest effect both in preventing such hemorrhage in the chest, as would probably have produced suffocation, and also in averting a degree of inflammation in the thorax, which would have proved fatal.

Mr. John Bell very judiciously condemns the seton, used by M. Guerin: "Had M. Guerin (says he) been asked what good it was to do, it would have been difficult for him to have invented even a plausible apology for the practice, which, if it was not doing good, could not fail to do harm. Was this seton necessary for keeping the wound open? No, surely; for the wound could not have closed, while it was irritated, and kept in suppuration by splinters of bone, and a piece of cloth within the breast. Was it to draw the piece of cloth out? Surely, in the course of twenty days, a piece of cloth would have had some chance, at least, of being floated towards the wound, either by the natural flux of the matter, or by the help of a mild injection. Was it useful in supporting the discharge? This would have been a sore question for M. Guerin; for it supported the suppuration only by inflaming the chest; and where inflammation of the chest, or high cough, or bloody expectoration, or a profuse discharge, were the chief dangers, a great seton could hardly be a comfortable inmate in the breast. I think one might very boldly promise to produce bloody expectoration and terrible cough, profuse suppurations, and oppression, to any degree, by drawing such a cord across a sound thorax."

Mr. John Bell next censures M. Guerin for not having discovered the pricking piece of bone before the thirty-eighth day; and imputes this, in some degree, to the seton, the pain of drawing which across the chest deadened every lesser pain, and, consequently, the patient could not feel the trifling pricking of the bone, till his greater sufferings from the seton were allayed. "In short, (says Mr. John Bell) M. Guerin passes a great strap of coarse linen across the cavity of the chest, and when it causes inflammation, he thinks to subdue it by bleeding; when M. Guerin continued for thirty days drawing a coarse seton through the breast every morning, and bleeding for the cough every night, what did he do, but raise inflammation with his left hand, to shew how well he could cure it with his right?" (See *John Bell on Wounds, Vol.* 2, *p.* 36—38.)

2. When one of the intercostal arteries is wounded in the track of a narrow oblique wound, the nature of the accident cannot at first be known. The blood, which the vessel pours out, commonly makes its way into the cavity of the chest, where it causes an extravasation, which is more, or less considerable. But when the wound is ample, and penetrates in a direct manner, the effused blood, which has all the characters of arterial blood, leaves no doubt, concerning the injury of an intercostal artery. However, should there still be the least uncertainty, it may easily be dispelled, by introducing the end of a finger into the wound, and making pressure with it on the lower edge of the rib, which corresponds to the vessel suspected to be injured. Some have recommended introducing, under the rib, a hollow cylindrical piece of pasteboard; and they infer, that when the blood flows through its cavity, it comes from the intercostal artery; but, that if it passes out underneath the pasteboard, it issues from the cavity of the thorax. However, besides several objections, which might be urged against this method, its adoption cannot be made, unless there be a large, open wound, in which case, the plan may be dispensed with, because the place whence the blood flows, is now visible.

Surgeons, long ago, began to exercise their industry, in devising some means for suppressing hemorrhage from the intercostal arteries, in wounds of the chest. Gérard first proposed to stop such hemorrhage, by means of a ligature. His plan was to enlarge the external wound, as far as the upper edge of the rib, corresponding to the intercostal artery, which is wounded, and then to introduce into the chest a common curved needle, armed with a ligature, to which is attached a dossil of lint. The needle is to be passed behind the rib, rather higher than the superior edge of the bone. The point of the instrument is then to be pushed, from within outward, and brought out through the external wound, together with the ligature, which follows it. When the dossil has come into contact with the ar-

tery, the two ends of the ligature are to be tied over a thick compress, placed on the outside of the rib. In this manner, the bone is surrounded with the ligature, and the artery compressed.

Goulard, a surgeon of Montpelier, having found difficulty in passing a common needle, whose shape little corresponded to the track, through which it had to pass, being curved towards its point, and straight towards the eye, had a particular one constructed for this operation. He also feared, that the former instrument, which has a sharp point, and edges, might wound the lungs. The one, which Goulard invented, formed three-fourths of a circle, and was fixed on a long handle, which facilitated its being introduced. The eye, in which the ligature is to be put, is situated near the point, which is a little blunted, and the ligature lies also in a groove, constructed along the convexity of the instrument. When this needle had passed through the intercostal muscles, and its point had made its appearance over the rib, which was above the artery, the ligature used to be untied, and held, while the needle was withdrawn at the place, where it had entered. The ligature was then tied, just in the same manner, as in Gérard's method.

Since the use of the ligature, it has been thought, that compression might answer better. Lóttery, professor of anatomy in the university of Turin, had constructed, for this purpose, a steel plate, which he submitted to the inspection of the Academy of Surgery, and is both described, and engraved in the second volume, 4to. of the Memoirs of this Society. This plate, as we have said, is made of steel, and is of a long shape; narrow at one end; broad at the other; curved in two directions at its narrow part; and pierced at this place with some holes, by means of which a compress, calculated for compressing the artery, is fastened on the instrument, an opening having been first made in the situation of the wound of the vessel, for the purpose of giving vent to blood, already extravasated in the chest. The other end of the steel plate has two long parallel slits, through which a ribband is passed, in order to fasten the instrument.

This steel contrivance is used in the following manner: when the wound, corresponding to the intercostal artery, is sufficiently extensive in the transverse direction, the narrow, bent end of the instrument is to be introduced, in such a way, that the lower edge of the rib above may lie in the concavity of the curvature, and the compress press on the edge of the bone, and, of course, on the artery. The rest of the instrument applies itself to the side of the thorax, in which situation it is to be fastened. When the wound is not ample enough, a sufficient dilatation of it must be made for the introduction of the instrument.

M. Quesnay made use of a piece of ivory, which he covered with lint, &c. and then introduced within the chest. The instrument was then drawn from within outward, by means of a ribband, which was fastened to it, and thus the necessary compression was produced.

Quesnay's plan is somewhat like that invented by Lóttery. But, to have introduced the compress entirely into the thorax, together with the ivory, which was the basis of it, and then to have drawn the contrivance from within outward, as was probably intended, a very large wound would have been indispensable. This is also one of the objections to Lóttery's instrument, which, in fact, could only be employed, when there was a free and ample opening. However, there are other objections to this instrument: it obstructs the motion of the thorax; it prevents blood, extravasated in the chest, from readily making its escape, notwithstanding the opening made in the curved part of the instrument; and, lastly, it does not effectually stop the bleeding, because it does not hinder the rib from rising, against which the pressure should be made, and, consequently, the hemorrhage may then take place.

Belloque, seeing the inefficacy of all the compressing means, used before his time, and their inconveniencies, invented an instrument, which, he says, is calculated for making proper pressure, and, following the motion of the ribs, without hindering the escape of extravasated blood. The machine is engraved, and described, in 2 tom. 4to. of the Memoirs of the Royal Academy of Surgery in France. It is composed of two plates, which are wadded, and capable of being approximated, by means of a screw. This instrument, as M. Sabatier observes, does indeed promise to be completely effectual in its action; but, it is complicated, and awkward, and its utility is founded on the supposition of the wound being larger, than wounds are, which are made with common weapons.

As the object is to make pressure on the artery, it is quite unnecessary to have, for this rare accident, numerous instruments, which could seldom be at hand, and which are also liable to all the above objections. A common dossil of lint (says Sabatier), fastened to a strong ligature, and introduced between the two ribs, or even quite into the chest, and then drawn, from within outward, like Quesnay's compress, would fulfil every

desirable purpose. This being done, the external wound should be covered with simple dressings, and a bandage applied round the body. The patient should be freely, and repeatedly bled, and treated on the most rigorous antiphlogistic plan; every method being adopted, which seems proper, in cases of wounds penetrating the chest, which are almost always attended with symptoms of high inflammation and irritation. The dressings should not be removed, till the wound has suppurated, and then the rest of the treatment resembles that, which becomes necessary in wounds with extravasation, of which we shall presently speak.

3. The protrusion of a portion of the lungs, in consequence of wounds penetrating the chest, is a very unusual case; but, there are some instances recorded by writers. Schenckius relates an example, taken from Rolandus, one of the commentators on Albucasis. Rolandus having been called to a man, who had been wounded in the thorax, six days before, found a portion of the lungs protruded, and in a state of mortification, in consequence of the compression, which it had sustained. This surgeon extirpated the part, and applied astringent powders to the wound: the patient recovered in a very little time, without any indisposition whatever remaining.

Tulpius has recorded a similar fact. A man received an extensive wound, just below his left nipple. His naturally gay disposition, however, led him to neglect the injury; and, on the third day, a piece of the lungs, three finger-breadths long, protruded at the wound. The patient went to Amsterdam, whence he was distant two days' journey, for the purpose of receiving succour in one of the hospitals of that city. The protruded piece of lung, which was already mortifying, was tied, and cut off with scissars. It weighed three ounces. The wound healed in a fortnight, and the patient experienced no complaint afterwards, except a slight cough, which troubled him from time to time. The man survived the accident six years, leading a wandering, drunken life. After death, nothing particular was observed in the thorax, except that the lungs had become adherent to the pleura, in the situation of the wound. Fabricius Hildanus also relates a case, which was communicated to him by Abel Roscius. A man was wounded with a knife, between the fifth and sixth ribs, near the sternum. A piece of lung protruded through the opening, and it was wished to reduce the part; but, as it seemed to assume a livid colour, it was extirpated with the actual cautery. Having dilated the wound, and kept the ribs apart, with a wedge, made of wood, the portion of lung, which had been girt by the opening, was returned. The patient after taking, what were called, pectoral and vulnerary medicines, soon got well, and felt no complaints in his chest afterwards.

A fourth example of a piece of lung, making a protrusion through a wound in the thorax, is among the cases, recorded by the celebrated Ruysch. The servant of a sea-faring man was wounded in the anterior and inferior part of the chest, and was immediately attended by a surgeon, who mistook the protruded piece of lung, for a portion of omentum, and applied a tight ligature round it. Ruysch, who was called in to the case, soon detected the error, which had been committed; but, he had no apprehensions, as he was convinced, that the wound would heal very well, as soon as the tied piece of lung was detached. The event justified his prognosis, and the patient recovered, in the same manner as the above-mentioned ones.

When the piece of protruded lung is sound, and its small size would admit of its being reduced, the attempt ought to be made, without the least delay. It should be done on the same principles, as those, on which we return into the abdomen a piece of protruded intestine, or omentum. (See *Abdomen*.) A recurrence of the accident is to be prevented by closing the wound, and placing a compress over it. But, when the piece of lung is already in a mortified state, in consequence of the constriction, which it has suffered, or when its large size prevents reduction, Sabatier is of opinion, that the only resource is to extirpate the part, after applying a ligature round its base. If the latter step were not taken, a dangerous hemorrhage might follow, or else an extravasation of blood in the thorax. (*Médecine Opératoire*, *tom.* 2, *p.* 224.) However, the practice just now recommended seems very questionable: in the instance of mortification, extirpation is clearly unnecessary, as the dead part will naturally be thrown off by a spontaneous process; and, when the wound is too small to allow the part to be returned, ought it not to be dilated, rather than cut off a considerable portion, or even any, of the lung?

4. Emphysema is another symptom, with which wounds penetrating the chest are frequently complicated, especially, when they are small, and do not enter the thorax in a direct manner. When such wounds are small, and not straight in their course; when their track is rendered impervious either by some change in the situation of the muscles, by the swelling, by clots of blood, or by any extraneous substances; air may in-

sinuate itself into the cellular substance, so as to cause a great deal of tumour and distention. The emphysema is easily distinguishable by the tumefaction of the part affected, without any pain, or change of colour in the skin, and by the crepitation, which is perceptible, on making the air quit the situation which it occupies, and pass into the adjoining cavities of the cellular substance. The emphysema may take place, in cases in which the lungs are not wounded, and also in others, in which they are so. In the first instance, the emphysematous swelling is caused by the external air, which insinuates itself into the cavity of the thorax through the wound, during the first inspirations, which follow the occurrence of the accident, and the same air is expelled in the subsequent acts of expiration. In the second case, the emphysema arises from the escape of air from the lungs, during inspiration, first into the cavity of the thorax, and thence, through the inner opening of the external wound, into the cellular substance.

I should not have deemed it necessary to have said any thing in this part of the work, on the present subject, but should have contented myself with referring the reader to the article *Emphysema*, were not the cause of this symptom rather perplexing, and, did I not hope, that the following extract from Dr. Halliday's late publication will tend to facilitate the comprehension of these cases. This gentleman mentions the following circumstances, under which air may escape from the lungs, or emphysema arise.

1st. "An injury or disease of the pleura pulmonalis, causing a wound or ulceration of that membrane, and thus allowing the air to escape from the lungs, as in oblique external wounds, where the outer opening, and that of the pleura costalis have healed, or closed up, and in ulcers of the surface of the lungs.

2dly. "The pleura pulmonalis, and pleura costalis, may be wounded or ulcerated, when there is no external opening, as when the ends of fractured ribs penetrate through both into the substance of the lungs, and it is from this accident, &c. that emphysema most commonly takes place.

3dly. "The common integuments of the parietes of the chest, the intercostal muscles, and the pleura costalis, may be wounded, while the pleura pulmonalis and the lungs remain uninjured, so that the air admitted from without, and collected in the cavity of the thorax, may be pressed into the cellular membrane, so as to occasion emphysema."

Dr. Halliday shortly afterwards remarks: "that the lungs in the thorax, have often, and not unaptly, been compared to a bladder in a close pair of bellows: but if we suppose the bellows to be divided into two compartments, and each of these to contain a bladder, which mutually communicate with each other, and with the external air, by means of a tube, which is exactly adapted to the nozzle of the bellows, and which admits the air only into the cavity of the bladders, and not into the space, betwixt the bladders and bellows, we shall then have a perfect representation of the mechanical structure of the thorax. The bellows will represent the thorax, divided in the middle by the mediastinum; the bladders will represent the lungs of the right and left sides; and the tube, which communicates with the bladders and with the external air, will represent the trachea. The only thing, which is wanting to render this mechanical representation perfect, is, that the bladders should exactly fill the bellows, so as to leave no air betwixt them and the bellows."

Dr. Halliday notices, than when we lift up the handle of the bellows, the bladders become filled by the external air, which rushes in through the tube, which communicates with both of them. When the handle is depressed, the air is expelled again. In the like manner, the lungs are filled with air, and emptied again when the capacity of the chest is enlarged by the inspiratory muscles, and then diminished by the expiratory ones.

When emphysema arises from a wound, or ulceration of the pleura pulmonalis, on one side of the thorax, the case is nearly the same as if an opening were made in one of the bladders, which opening would form a communication, as Dr. Halliday observes, with the bellows and bladder on one side. If this should happen, while the handle of the bellows is depressed, no sooner is the handle raised, than air rushes into the space, betwixt the bladder and bellows, and, on keeping up the handle a little while, the bladder will become quite collapsed, and the place which it occupied, while distended, will now be occupied by the air. If now, says Dr. Halliday, "we attempt to force out the air, by depressing the handle of the bellows, we shall find that this cannot be done; for, there is no direct communication, between the bellows and the external air; and, as the effused air presses equally on all parts of the collapsed bladder, it cannot escape through it."

When the thorax is expanded in inspiration, the pressure is taken off the surface of the wounded lung, and the air, which now enters this organ, instead of distending its cells, passes through its wound into the space between the pleura pulmonalis, and pleura costalis. The lung will, indeed, be partially expanded,

as long as inspiration on that side goes on; the more so, the smaller its wound is. At every expiration, however, when the thorax is diminished, the effused air will be compressed against the wounded lung; but none of the air, which has escaped, can re-enter the lung again; "because (as Dr. Halliday accurately remarks) the whole of the air contained in the lung must be forced out, and then the pressure (of the air) against every part of the collapsed lung being equal, will prevent its separating any part, so as to make a passage for itself into the trachea." Thus fresh air accumulates at every inspiration in the space, between the pluræ, while none can escape from the same situation during expiration, and the quantity accumulated will, at last, equal that which is received into the other lung, during the most powerful inspiration. Dr. Halliday notices, that some authors have termed this case *thoracic emphysema*; it is clearly attended with no diffusion of air in the cellular substance, a circumstance, generally implied, when we speak of emphysema.

When both the pleura pulmonalis, and pleura costalis are wounded, the same effusion of air between these two membranes continues to take place, from the abovementioned causes, till the lung is collapsed. When an attempt is now made to expire, the injured side of the thorax must continue distended, notwithstanding every effort of the patient. However, when, in this expiratory act, the capacity of the thorax is diminished, and the air compressed, a part of it finds its way, through the wound in the pleura costalis, into the common cellular substance of the parietes of the chest.

The passage of air into the cavity of the thorax during inspiration is, as Dr. Halliday observes, now more easy, than the return of that, which is already effused in the cellular membrane, and consequently, the *subcutaneous emphysema* continues to increase with the rapidity, which is remarkable, as long as the patient lives.

To explain the origin of emphysema, in cases of wounds, which only enter the chest, and do not injure the lungs at all, Dr. Halliday has recourse to the simile of the bellows, and bladders. Were an opening made into the bellows, without injuring the contained bladders, if the access of air by this opening be more free, than that by the nozzle, communicating with the cavity of the bladder, more air will enter by the opening, than by the pipe, on the handle being raised, so that the bladder will not rise as before, when no opening in the side of the bellows existed. If the latter opening be smaller, than that of the pipe, the bladder will only be partially filled, and, on depressing the handle of the bellows, the air, contained in the bladder, and that between the bladder and the bellows, will be expelled, in the same proportion to each other, as that, in which they were formerly filled. This process would continue to go on in the same way, did not the bladder naturally collapse more and more from its gravitation. Let us now stop the mouth of the pipe, while the handle of the bellows is raised, and the bladder partially filled. On trying next to depress the handle, it results, that, as no air can escape from the pipe, that air, which is contained between the bladder and the bellows, must be first evacuated, while that, contained in the bladder of the sound side, will be forced into the bladder on the injured side, and either distend it, so as to rupture it, or cause it to protrude.

Hence, in the case of a wound, penetrating the chest, without injuring the lungs, if the air can enter more freely by the wound, than by the trachea, more of it will enter, in the act of inspiration, into the cavity of the thorax, than into the lungs. On the contrary, when the opening of the wound is not so large as that of the trachea, less air will enter the thorax, than the lungs.

In expiration, the air will be expelled from the two different situations, in proportion to the quantity, which enters each of them in inspiration, and, no air at all would accumulate in the thorax, did not the lungs always tend to collapse from their gravitation. Should, however, the patient, in making an effort to expire, contract the glottis, the air, contained in the lungs of the sound side, may be propelled into the bronchia and air-cells of the lungs, on the same side as the wound, so as to distend them, and even make them protrude at the wound.

Dr. Halliday remarks, that such a protrusion often happens, when wounds are made in dogs, and has been erroneously adduced as an argument against the collapse of the lungs, when an opening is made into the thorax of the human subject. See *Observations on Emphysema, by A. Halliday, M. D.* 1807. This work is highly deserving of perusal.

For information, concerning the treatment of the affection, the reader is referred to the article *Emphysema*, in this Dictionary.

5. We have already noticed, that wounds of the thorax may injure one of the intercostal arteries, and when the blood cannot find free vent outward, it may become extravasated in the cavity of the chest. The same consequence may follow wounds of the pulmonary vessels, those of the heart, or of the heart itself.

When the hemorrhage, however, takes place from vessels above a certain size, the wounded person dies almost instantaneously; but, when they are not so large, he may live for a greater or less time, and receive the succour of surgery.

The following are the symptoms, which denote an extravasation of blood in the thorax. The patient feels great oppression, and such uneasiness as will not let him long continue in one position. He experiences much difficulty in standing up, or sitting up in his bed, unless he bends his body very much forward, in which position, the diaphragm is relaxed, and not so much dragged by the weight of the extravasated fluid. When the thighs are bent, the patient can lie with tolerable ease on his back; he is also not averse to lying on the side, on which the wound is situated; but, he cannot place himself on the opposite one, without feeling very acute pain in the situation of the mediastinum.

His respiration is short, frequent, and interrupted by sighs; his veins become empty; a mortal paleness spreads over his countenance; his extremities become cold; a viscid perspiration covers his neck and temples; his teeth chatter; his pulse becomes weak, and if, as most frequently happens, the lungs are wounded, he spits up frothy blood, and air issues from the wound.

Though one might suppose the above class of symptoms were always attendant on a considerable effusion of blood in the thorax, yet they are not so. Wounded persons have been known to die of such an extravasation, whose respiration was tolerably free, and who did not complain of suffering more inconvenience in one posture than another. Sabatier says, that several facts of this kind have fallen under his own observation. Other wounded persons, also, who have suffered most of the complaints ascribable to extravasations of blood in the thorax, have been cured by ordinary means. M. Mery gives an account of a young man, wounded in the anterior and superior part of the chest, about two o'clock in the morning, who had such difficulty of breathing, and so much fever, five hours afterwards, that M. Mery was of opinion, that an extravasation had happened, and he was thinking of making an opening for the evacuation of the blood. A tumour, which originated near the great pectoral muscle, and presented, neither the feel of fluctuation, nor that of emphysema, made him suspend his decision. Some bleedings, and the application to the tumour of compresses, dipt in a mixture of spirit of wine and water, dispersed the symptoms. This recital shews, as M. Mery has remarked, how equivocal the symptoms of an extravasation in the chest are; how difficult it is to form an opinion; and how liable to failure any operation is.

However, even the assemblage of the above symptoms, did not lead M. J. L. Petit into a mistake. Having been requested to assist at an operation, which was about to be done on a wounded man, about whose armpit, pectoralis major, and latissimus dorsi muscles, a prodigious emphysematous swelling had taken place; whose respiration was painful and difficult; and who spit up frothy blood from his mouth; M. Petit gave it as his opinion, that it was unnecessary to make an opening into the chest. He thought, that it would be sufficient to enlarge the wound, which was at a little distance from the armpit, near the edge of the latissimus dorsi, so as to give vent to the effused air. This advice having been followed, the emphysema in a little while disappeared, and the patient soon recovered.

The equivocal nature of the symptoms of extravasations of blood in the thorax, has induced practitioners to pay the most scrupulous attention to every circumstance attendant on these cases. Valentine remarked, in several instances, that a few days after the wound, an ecchymosis occurred, at the angle of the false ribs, and spread towards the loins. The ecchymosis is described as being of a clear purple colour, like the spots, which sometimes form on the abdomen, a little while after death. Such is the difference, between this ecchymosis and that, which consists of an extravasation of blood in the cellular substance, from the rupture of blood-vessels, which makes its appearance shortly after the accident, begins close to the injury itself, and is of a deep colour, commonly spotted with some red points. Valentine advised a counter-opening to be made, in a case, in which most of the symptoms of extravasation were combined with the above sort of ecchymosis. The advice was overruled, and the patient soon afterwards died. More, than six pints of blood, were found extravasated in the thorax.

Sabatier remarks, that we cannot too highly applaud the zeal of those practitioners, who endeavour to dispel the doubts, which still prevail in some parts of surgery. At the same time, he thinks, that all, who take interest in the improvement of this science, should endeavour to ascertain the truth of any new observations, which are offered. Hence, he deems it proper to relate a case, which was communicated to him by M. Saucerotte (the father) an eminent military surgeon, and which shews, that the ecchymosis, observed by Valentine, is, at least, not invariably attendant on

extravasations of blood in the chest. A carabinier, who had received a thrust with a sabre in the right side of the thorax, above the tendon of the pectoralis major, appeared to be going on very well for the first four days following the accident. On the fifth, he complained of difficulty of breathing, uneasiness, and an inability of lying on the left side, without aggravating his complaints. He complained of a great deal of pain in the region of the liver, and at the top of the shoulder. His pulse was small and contracted, and rather hard, than weak. The right side of the chest seemed larger, than the left. On the eighth and ninth day, the symptoms became more urgent, and the patient found no ease, except in leaning on his right side, and supporting himself on a chair, placed across his bed. This assemblage of symptoms indicated an extravasation of blood in the right cavity of the thorax; but, as the ecchymosis, which M. Valentine has described, was not apparent, M. Saucerotte thought that they might be deceitful. Their long continuance, however, had made him resolve to make a counter-opening, but, in the mean while, the patient died, in the night between the ninth and tenth day. When the operation was done on the dead body, a pint of putrid blood flowed out.

When the surgeon feels assured, that an extravasation of blood in the thorax has really occurred, the only indication is to make an opening for its escape. However, before undertaking this operation, the revived state of the pulse, the return of warmth in the extremities, and the cessation of convulsions, ought to denote, that the hemorrhage no longer continues from the wounded vessels. If this were not the case, a fresh quantity of blood would soon be extravasated, and the patient die exhausted. Besides, by delaying to make an opening for the discharge of the blood, we give nature time to employ her own resources. Observers have recorded instances, in which extravasations of blood in the thorax have got well, without any operation. Fabricius ab Aquapendente relates an example of a man receiving so narrow a wound in the chest, that it was impossible to make out, whether it had penetrated the pleura, or not. The spitting of blood, weight on the diaphragm, fever, and oppression, with which the patient was soon seized, removed all uncertainty. It was determined to make an opening into the chest, when a large glassful of blood came away with the urine; the pain now subsided, the fever and other complaints abated; and a speedy recovery followed.

Though Fabricius sets this case down as one of extravasation, and that it was cured, in consequence of the evacuation of blood with the urine, both inferences may, at all events, be rationally questioned.

Authors make mention of five methods of discharging collections of blood in the thorax; viz. 1st. By placing the patient in a posture, which favours the escape of the blood; 2dly. By introducing a syringe for the purpose of sucking it out, or a mere cannula, through which it is to flow; 3dly. By enlarging the wound; 4thly. By employing injections; 5thly. By making an opening into the thorax in a depending situation.

1. Success cannot be expected from merely placing the patient in a posture, which is favourable to the escape of the extravasated blood, except when the wound is situated at the inferior part of the chest, and is large and direct in its course. Paré successfully adopted this method in the case of a soldier, who was stabbed in three places with a sword, one of the wounds, which entered the chest, being situated under the right nipple. The man was first dressed by a surgeon, who made several sutures. The patient was soon afterwards attacked with considerable difficulty of breathing, fever, coughing, spitting of blood, and acute pain in the side. Paré, who was consulted the next day, suspected, that an extravasation had happened; consequently, he cut out the sutures, and placed the patient in a position, in which his feet were much more raised, than the head. Paré also recommended him to hold his breath, and then introduced his finger into the wound, in order to take away some clots of blood, which appeared at its orifice. By these steps, the discharge of seven, or eight ounces, of fetid, coagulated blood, was effected. Injections of barley-water, in which were mixed a little honey of roses and sugar-candy, gave the patient ease, and finished the cure.

2. The idea of sucking out of the cavity of the thorax, by means of a syringe, blood extravasated in this situation, was conceived a long while ago. The pipes of all syringes, for this purpose, should have blunt ends, lest they should injure the lungs. Mere tubes, containing a stilet, have also frequently been employed. In the cases, related by Scultetus, there is an example, in which an instrument of the latter sort was successfully made use of. No syringe, nor any suction with the mouth, was requisite; it was only found necessary to introduce the tube, and then withdraw the stilet.

Lamotte only used a simple cannula, which he introduced into the centre of the extravasation. Then having placed the patient in what he conceived to be the

most favourable posture, and requested him to hold his breath, he drew off the collection of fluid. The cases, numbered 216, 217, 218, shew the success, which attended this method. Although it might also have answered very well in case 219, Lamotte saw, that the exceedingly high situation of the wound would not have allowed all the blood to be discharged, and, therefore, he made a counter-opening. Thus the thorax was completely emptied, and a recovery the consequence. When a cannula is employed, authors recommend it to be introduced every day, till the bad symptoms cease, and no more fluid escapes through the cavity of the instrument. After having given vent to blood, it allows a bloody serous fluid to escape, and at a later period pus, which becomes of a thicker and thicker consistence, the nearer the patient is to a recovery.

3. The cases, in which an enlargement of a wound, complicated with an extravasation in the chest, should be practised, are those, in which there is reason for thinking, that the situation is favourable for the escape of the blood. The operation is performed by introducing a grooved director, along which the knife is to be guided. The integuments, and external muscles, are to be divided in a perpendicular direction, and the intercostal muscles in a line parallel to the ribs. Care is to be taken not to cut too near the lower edge of the upper rib, lest the intercostal artery should be wounded. Dionis relates, that he practised such an operation on a soldier, who was wounded at Béfort in 1703, by the thrust of a sword below the right nipple, which made a direct opening into the thorax. As the patient was half a league from the town, his chest had become full of blood, before he could be assisted. When the extravasated fluid had been let out, Dionis made the patient lie on the wounded side, during the night, and in proportion as the blood continued to be thus evacuated, the breathing became free from oppression. The next day, the thorax was quite emptied, and the cure was so speedy, that the patient was in a state to join the army, a month afterwards.

4. The methods, which have just been explained, may be of use, when the blood retains its natural state of fluidity; but, when it has coagulated, as often happens, they can be of no avail. In this circumstance, the best plan, which can be adopted, is to inject warm water into the chest, which injection is the best calculated for loosening, and dissolving the coagula, and washing them out of the wound. A proper opening must, of course, be previously made. The French writers, even the modern ones (*Sabatier*) most absurdly recommend the injection of various detergent vulnerary decoctions, and of solutions of honey of roses, soap, salt, &c. What idea these authors can entertain of the great sensibility and tendency to inflammation of the lungs and pleura, or what good they can expect from such applications, is difficult of conception. I am firmly convinced, that the meanest scribbler on surgery, in this country, would be ashamed of being an authority for such advice.

5. When the wound is narrow, and situated at the upper part of the chest, we cannot expect to be able to give vent to the extravasated blood, without making a counter-opening at the lower part of this cavity. The best place for making the opening, and the proper manner of executing the operation, are explained in the article, *Paracentesis of the Thorax*.

When the opening has been made, the blood makes its escape. Its exit is to be promoted by placing the patient in a posture, which makes the opening as depending as possible, and by desiring him to hold his breath.

After as much blood, as can be obtained, has been taken out, the common plan has been to maintain the opening, and not let it heal, till after a certain time.

For this purpose, the old surgeons used to employ tents, made of lint, which were proportioned to the size of the opening, being short, soft, and flattened. They had a sort of head, and a double ligature attached to them, and were often dipped in some kind of application. Tents have now been quite abandoned, as they are apt to bring on an inflammation of the lungs, hinder the escape of whatever fluid is contained in the chest, and cause great irritation in the parts, through which it passes, occasioning pain, inflammation, and even exfoliations from the ribs.

Others have recommended introducing the end of a kind of wick, which, they contend, keeps open the wound, without hindering the escape of fluids. Such advice, however, is not free from objections, nor is the latter reason altogether true.

Le Dran preferred tents to wicks: he states, that the hemorrhage can only be stopped by the coagulum, which forms over the mouth of the wounded vessel. The clot is elongated, and even continued into the vessel itself, and while it remains there, no more blood is effused. In the mean while, it flows into the collateral vessels; and the mouth of the vessel closes, and includes within its parietes, the portion of the coagulum, which has formed in it. Thus the clot becomes gradually separated into two portions,

one of which remains in the vessels, and acts as a sort of plug, while the other is detached with the suppuration. Hence, continues Le Dran, when a tent is introduced into the opening, which has been made, it must confine a part of the blood, which has been extravasated in the chest, and without which portion being retained, the clot would not be supported, but fall off, before the mouth of the vessel had closed, and the hemorrhage constantly continue. Without entering into an examination of Le Dran's theories of the stoppage of bleeding, a subject, which is fully explained in the article *Hemorrhage*, we may only remark, that this author's predilection for the use of tents is founded on a supposition, that the counter-opening has been made, before the hemorrhage from the vessels has ceased. Every one, however, agrees, that no steps should be taken for the discharge of the blood, contained in the thorax, before being assured, that the hemorrhage has ceased. Hence, the tent can only be regarded as hurtful. But, dismissing from consideration wicks and tents, the best means of maintaining an opening, (were such thing necessary, which cannot frequently be the case,) would be, a short cannula, with a rim to keep it from slipping into the thorax, and two little rings for confining it in its situation with a ribband. This should only just enter deeply enough to have its inner orifice on a level, or very little further inward, than the pleura-costalis, and consequently it could not injure, nor irritate the lungs. A plug should be kept in its outer opening, and withdrawn, as often as occasion requires, that is, as often as any material quantity of fluid collects, and requires to be discharged.

When the patient has been dressed, he is to be kept in bed, with his head and chest somewhat elevated, and his thighs bent, in which position, the breathing will be found to be least oppressed. It is usual also to recommend him to lie, as much as possible, on the side on which the operation has been done. He is to keep himself in as still, and quiet, a condition as he can. He is to be put on very low diet, and, if his strength allows, he is to be bled, and this evacuation repeated, with other antiphlogistic means, as often as the urgency of the fever and inflammatory symptoms indicates, and the strength of the constitution allows. Bleeding from the arm, besides counteracting inflammation in the chest, which is a principal source of danger, does good by lessening the force of the circulation in the wounded vessels, and thus it diminishes the tendency to internal hemorrhage.

In keeping open wounds of the chest, the surgeon must be careful, that no tents, nor any of the dressings, glide into the cavity of the pleura. Numerous cases on record shew the necessity of using great caution, that no accident of this kind occur. Tulpius makes mention of a Danish gentleman, who had been under a careless surgeon, on account of a wound in the thorax, and who coughed up, six months afterwards, a large tent. A similar fact is recorded, among the cases collected and published by Fabricius Hildanus. A man was stabbed with a sword in the right side of the chest, near the axilla, between the second and third ribs. A great deal of blood was discharged, during the first fortnight, both from the wound, and by the mouth. The wound was successfully healed; but, the patient continued to suffer considerable difficulty of breathing, and an incessant cough, and he used to spit up a greenish, fetid matter. Three months afterwards, he coughed up two tents, which had slipped into the cavity of the thorax, from beneath the dressings, with which the wound had been covered.

In whatever condition the patient may be, any change in the antiphlogistic regimen must be made with very great circumspection. Too much nourishment, talking too frequently, and any exertion, are circumstances, which may induce a renewal of the hemorrhage, and extravasation, even after a considerable time. Vesalius saw an accident of this nature happen, a fortnight after the wound, and eleven days after the operation for empyema. A Biscayan soldier, who had been stabbed in two places with a sword above the right nipple, was attacked by fever, difficulty of breathing, restlessness, and acute pain at the bottom of the chest. These symptoms indicated to Vesalius, that an extravasation had taken place; but, he was afraid of making an opening into the chest, for fear the hemorrhage should still continue from the wounded vessels. However, as the patient remained in the same state, the fourth day after the receipt of the wounds, and his strength still lasted, Vesalius undertook the operation, by which a considerable quantity of extravasated blood was discharged. The patient felt great relief at the instant. The oozing of blood continued for a few days, after which a favourable suppuration took place in all the three wounds, and the case was, therefore, expected to end well. But, the patient having regained his strength, and taken too much food, the recurrence of hemorrhage caused his death, at the very time when he seemed to be getting well. M. Lombard, well known for some excellent productions on surgery, saw a soldier die instantaneously

of internal hemorrhage, from throwing a bowl at some nine-pins, two months after he had been cured of a wound of the chest and lungs.

Authors in general advise us, before we close the wound, for the purpose of healing it, to make the patient expel the air from the chest. For this object, they advise the patient to be requested to make a strong inspiration, with the wound closed, and then a long slow expiration with it open, and so on, till as much of the air as possible is discharged, and then the wound is to be accurately closed with sticking plaster. From what we have said, however, in the article *Emphysema*, it will appear, that when there is a direct opening into the thorax, so as to admit the external air, the lungs on one side collapse, and remain so till the wound is healed, and the air absorbed. When one of these organs is wounded, a collapsed state is, indeed, the best condition, in which it can possibly be for a certain time, that is, till the breach of continuity in it has healed. All efforts to make the lung expand, by exhausting the air from the cavity of the pleura, seem unavailing; but, there is certainly no objection to not closing the wound, before as much air has been expelled in the above way, as can be thus got rid of.

Fistulæ sometimes continue for a long while after wounds of the thorax. Felix Platner mentions an instance, in which a man had in his chest a fistulous opening, out of which the air rushed with such force as to blow out a candle. He lived a long while with this disease, without suffering any particular inconvenience.

Another occasional consequence of openings made in the chest, is a hernia of the lungs, an affection, of which, Sabatier says, he is not aware, that any one has spoken. This gentleman, however, has seen such a case. A soldier, thirty years of age, who had been wounded at Rostock with a bayonet, in the right side of the chest, between the middle part of the fifth and sixth true ribs, had several bad symptoms which he survived. The wound was successfully healed; but, as the intercostal muscles had been divided to a great extent, and could not be approximated with precision, there remained an empty space under the integuments, which allowed a piece of the lungs, as large as a walnut, to protrude between the ribs. The swelling enlarged at the time of inspiration, and grew smaller when expiration took place. It only occasioned a slight pain, without any oppression in the chest.

The making of an opening into the chest, as already spoken of, is recommended, as Sabatier remarks, by all authors, who have treated of wounds of the chest. However, it does not appear, that the operation has been often done. Few instances are to be met with on record. J. L. Petit does not make mention of even one. Lamotte, who had the care of an infinite number of patients, never practised the operation, except twice, and, in one of these instances, it was done to let out a collection of matter in the thorax, which had occurred after a wound, which injured the lungs. Sabatier notices, that the seven volumes of the *Journal de Médecine Militaire*, which contain a collection of the most interesting cases, which have presented themselves in the military hospitals, record no example, in which it was necessary to resort to the operation in question. No instances are related in the *Mém. de l'Acad. de Chirurgie*. Sabatier says, he has enquired of many army-surgeons; but, none of them have either seen the operation done by others, or performed it themselves. M. Saucerotte, observes Sabatier, is the only one, who did it with success in a case, in which the exigency for the operation would not be expected. It was in an instance of a gun-shot wound. The necessary dilatations, and the extraction of extraneous substances, had diminished the inflammatory symptoms. These were subsiding entirely, when, on the third day, a violent hemorrhage took place from one of the branches of the internal mammary artery. This loss of blood, together with repeated venesections, did not hinder a considerable extravasation of blood in the chest from happening on the fifth day. The patient was threatened with suffocation. He was made to bend forward, in order to promote the escape of the fluid, of which about a pint, in colour like wine-lees, and having a disagreeable smell, was discharged. A considerable quantity was in this way evacuated, every morning and evening. The posture, in which the patient was necessarily put, and the efforts he was obliged to make to promote the evacuation, fatiguing him exceedingly, he consented to have a counter-opening made, at the lower part of the chest, on the eighteenth day. The operation gave vent to a pint of blood, of the same kind as that which had issued from the wound. The quantity emitted became daily less and less, and, in three months, the patient got quite well. Sabatier questions, from what has been stated, whether we may not conclude, that such extravasations of blood in the thorax, as admit of surgical aid, are exceedingly unfrequent cases, and that the symptoms, indicative of these instances, are not sufficiently clear, so

that most of the patients, with such extravasations die, without it being in the power of surgeons to make any attempt to save them.

Every systematic writer on surgery has treated of wounds of the thorax: *John Bell's Discourses on Wounds*, and *Sabatier's Médecine Opératoire*, from which latter I have extracted a great deal of the preceding account, seem to me to merit attentive perusal.

THROAT, WOUNDS OF. Injuries of this kind are often attended with considerable danger, on account of the great number of important parts, which are interested; but, mere cuts of the integuments of the throat and neck are not (generally speaking) dangerous cases, and do not materially differ from common incised wounds of the skin, in any other part of the body. They are not liable to be followed by any particular consequences, and require the same kind of treatment, as cuts in general do. (See *Wounds—Incised Wounds.*)

In wounds of the throat and neck, however, the larynx and trachea, pharynx and œsophagus, the trunk of the carotid artery, and all the principal branches of the external carotid, the large jugular vein, the eighth pair of nerves, and the recurrent nerve, are all exposed to injury; some much more so, than others; but, all of them occasionally not escaping the edge of the knife, or razor, or the point of the sword, or other instruments.

It would certainly amount to absurdity, to offer an account of what is to be done, in cases attended with some part of the mischief above pointed out; for, no patient, thus wounded, would ever be found alive. Wounds of the eighth pair of nerves are universally considered by all surgeons as certainly fatal. These nerves, we know, proceed down the neck, in the same sheath of cellular substance, which includes the carotid artery, and lie on the outside of this vessel, between it and the internal jugular vein.

Wounds, either of the carotid artery, or internal jugular vein, must for the most part prove immediately fatal, in consequence of the great and sudden loss of blood, which would inevitably arise from an open, cut wound, interesting these vessels. However, were any surgeon on the spot at the moment, he should immediately tie the end of the vessel, from which the blood gushes with the greatest force, which end, we know, would be the lower one of the carotid, and upper one of the jugular vein. One caution, however, is highly necessary in tying the carotid, viz. always to be sure, that the par vagum is excluded from the ligature; for were this nerve to be tied, this erroneous proceeding alone would remove every possibility of the patient's recovery.

If the mouth of the vessel could not be got at, pressure must be instantly resorted to, for the purpose of producing a temporary suppression of the hemorrhage. The surgeon should then either make the necessary enlargement of the wound in the integuments, with a due and constant recollection of the important parts near the place, or else, in the case of the carotid being injured, he should cut down to this vessel on the side towards the trachea, where no parts of great consequence are situated.

In lacerated wounds, the carotid artery may be injured, and yet the patient not immediately bleed to death; for, it is the nature of all wounds, attended with much laceration and contusion, not to bleed so freely as clean cuts. Mr. Abernethy has related a case, in which the carotid, and all the chief branches of it, were wounded in a man who was gored in the neck with a cow's horn; yet, death did not immediately follow, and there was time to have recourse to the ligature.

Punctured wounds might obviously injure, either the carotid, or the internal jugular vein, without the patient expiring of hemorrhage at once; because, the smallness of the wound in the skin, would often hinder the fatal effusion of blood.

However, when these vessels are wounded, the par vagum is generally wounded also, and the case is inevitably mortal, either immediately, from the direct effects both of the injury of the nerve, and sudden loss of blood, or very soon afterwards, the bleeding being of a slower, and more interrupted kind, which must depend on the lacerated nature of the wound, the small size of the opening in the vessel, or of that in the skin, &c.

Persons who attempt to commit suicide, by cutting their throats, do not often divide the carotid artery, on account of their incision being made too high up. Where the carotid arteries emerge from the chest, they are situated by the side of the trachea, and even a little more forward, than it. However, as these vessels proceed up the neck, they become more laterally situated with respect to the trachea; and when they have arrived at the upper part of the neck, where persons, who attempt to commit suicide, almost always cut, they become situated more backward, than the trachea, inclining towards the angle of the lower jaw.

The œsophagus is so deeply situated, lying close to the bodies of the vertebræ, and behind the trachea, that it is not often interested in any incised wounds,

which do not immediately prove fatal, in consequence of the division of other important parts. We read of many cases, in which this tube is said to have been wounded, and what is usually set down as a criterion of the fact, is the passage of victuals through the wound. The writers of many of these narrations have proved themselves most grossly ignorant of anatomy, by not knowing, that wounds made above the os hyoides, as they frequently are, may enter the mouth, and hence the victuals may escape through the cut, without the œsophagus, or pharynx, being at all concerned.

However, no doubt, the œsophagus has occasionally been wounded, without the patient perishing so immediately, as not to be capable of receiving any succour. Stabs, and gunshot-wounds, might obviously injure the œsophagus, and leave other important parts untouched.

Even were the œsophagus known to be wounded, its deep situation would prohibit us from doing any thing to the breach of continuity in the tube itself. The best plan would be to have recourse to antiphlogistic means, and to introduce a hollow bougie, from one of the nostrils, down the œsophagus, for the purpose of conveying nourishment and medicines into the stomach, without any risk of their getting out at the wound. An instrument of this kind will lie in the above situation, for any length of time, without occasioning any inconvenience, and, besides being advantageous for injecting nourishment and medicines down the passage, and keeping them from issuing at the wound, it prevents all necessity for the wounded œsophagus to act, and become disturbed, when there is occasion to take any kind of liquids, whether in the way of medicine, or food. The outer wound should be brought together, and treated on common principles.

When persons cut their throats, we have explained, that they do not often divide the carotid artery, owing to their incision being usually made high up in the neck, where this vessel has attained a very backward situation. When any serious hemorrhage does arise, it is sometimes from the lower branches of the lingual artery, but most frequently, from the superior thyroideal arteries. Such arteries may occasion a fatal bleeding, which, indeed, would more frequently be the event, than it actually is, did not the patient often faint, in which state the bleeding spontaneously ceases, and gives time for the arrival of surgical assistance.

I need hardly tell the reader, that these arteries are to be tied, and that this important object is the first, to which the surgeon should direct his attention. The danger of bleeding to death being obviated, as soon as possible, the other requisite measures may be more deliberately executed.

With respect to wounds of the trachea, the same plan of conveying food and medicines into the stomach, through a hollow bougie, introduced from one of the nostrils, down the œsophagus, is highly proper, though too much neglected. For, nothing creates such disturbance of the wound as the convulsive elevation and depression of the larynx and trachea, which are naturally attendant on the act of swallowing.

When the trachea is cut, the patient's power of forming the voice is more, or less, impaired, in consequence of the air passing into, and out of, the lungs, chiefly through the wound. Besides air, a considerable quantity of the natural mucus of the trachea is also continually coming out of the wound.

The grand means of accomplishing the union of wounds of the trachea, are a proper position of the head, and a rigorous observance of quietude. By raising the patient's head with pillows, and keeping his chin close to his breast, the edges of the wound, both in the skin and trachea, are placed in contact, even without any other assistance, unless the division of the trachea be exceedingly large. It is proper, however, to assist the agency of a suitable position with strips of sticking plaster, and also, according to most authors, with a suture, or two. But, the necessity for sutures must depend on the extent of the division of the trachea; for, unless most of the circle of this tube be cut, and position be neglected, the wound in it will not gape. The stitches should never be passed through the lining of the trachea, as this method would be likely to make it inflame, and occasion considerable coughing, and irritation, which would have very pernicious effects on the wound.

Should there be much coughing, apparently arising from irritation and inflammation in the trachea, bleeding is proper, if other considerations do not forbid it. The spermaceti mixture with opium, is also frequently of great service. I never saw a wound of the trachea unite entirely by the first intention.

THROMBUS. (from Θρόμβος, coagulated blood.) A clot of blood. The term has also been applied to a tumour, formed by a collection of extravasated, coagulated blood, under the integuments after bleeding. When such an extravasation, though of some extent, is not considerable, it is usually called an *ecchymosis*. (See this word, and also *Bleeding, Occasional Ill-consequences of.*)

A thrombus sometimes depends on the

surgeon having totally divided the vein; but, much more frequently on his not having made the opening in the vessel, properly correspond to that in the skin. The patient's altering the posture of his arm, while the blood is flowing into the basin, will often cause an interruption to the escape of the fluid from the external orifice of the puncture; and, consequently, it insinuates itself into the cellular substance in the vicinity of the opening in the vein. In proportion as the blood issues from the vessel, it becomes effused between the skin and fascia, covering the muscles, in the interstices of the cellular substance, and this, with more, or less rapidity, and in a greater, or lesser quantity, according as the edges of the skin impede more or less the outward escape of the fluid. Sometimes, also, a thrombus forms after venesection, when the usual dressings, compress, and bandage, have been put over the puncture, and the patient imprudently makes use of the arm, on which the operation has been done. This is more particularly liable to happen, when a very large opening has been made in the vein.

The accident is not attended with any danger, when the extravasation is inconsiderable; for, in this circumstance, the tumour generally admits of being easily resolved, by applying to it linen, dipped in any discutient lotion. If the swelling should be more extensive, applying to it a compress wet with a solution of common sea-salt, is deemed a very efficacious plan of promoting the absorption of the extravasated blood. Brandy, and a solution of the muriate of ammonia in vinegar, are likewise eligible applications.

It sometimes happens, that a thrombus induces inflammation and suppuration of the edges of the puncture. The treatment is now like that of any little abscess: a common linseed poultice may be applied, and, any considerable accumulation of matter should be prevented by making an opening with a lancet in proper time. As soon as the inflammatory symptoms have ceased, discutients should be resorted to again, for the purpose of dispersing the remaining clots of blood, and surrounding induration.

When the quantity of blood is exceedingly large, authors generally recommend opening the tumour at once, and, despairing of the power of the absorbents to remove the extravasation, they recommended, as much of the blood as possible, to be pressed out through the incision. I believe, however, that making an opening is seldom necessary, and often brings on inflammation, and suppuration, which might be avoided. I have never seen any case, in which there was any real occasion to make an opening for the discharge of the blood. A case of this kind, however, may certainly be conceived.

THY'MIUM. (said to be derived from Θυμος, thyme, because of the colour of this herb.) A wart, or kind of excrescence on the skin.

THY'MUS. (from Θυμα, an odour, because of its fragrant smell.) The herb thyme. In surgery, the term is often applied to warty excrescences on different parts of the body, particularly, about the pudenda and anus, and erroneously supposed (as I conceive) to be of a venereal nature.

THYROID GLAND DISEASED. (See *Bronchocele.*)

THYROID GLAND, EXTIRPATION OF. That such an operation, though attended with great difficulties, is not impracticable, is proved by the following example:

In the year 1784, J. Hyons, twenty years of age, experienced an acute pain at the middle and anterior part of the neck, in consequence of a violent extension of the head: this pain, which was only momentary, was followed by some difficulty of motion. About three months afterwards, a small, hard, indolent tumour appeared on the right side of the trachea; this swelling was unattended with pain or alteration in the colour of the integuments; the tumour seemed to be raised by a pulsatory action, which seemed to prove the existence of a large artery situated underneath, and in fact its base was situated on the general course of the carotid artery. The patient, feeling no inconvenience, neglected it until June, 1788. At this time the tumour was one inch in diameter; its progress, which in the first instance was slow, now augmented with proportionable rapidity; internal remedies, and topical applications, had no effect in preventing its increase; a fluctuation in its centre was soon evident; an incision was then made into this part, and a quantity of yellow serosity discharged. Three months after this operation, which was not of the least service, recourse was had to caustics, which were repeatedly applied without any advantage being obtained. On the 20th of March, 1791, she presented herself for admission at the Hôtel Dieu. At this period the tumour was two inches in diameter, round, hard, and attached to the right and middle part of the trachea, and pushed outwards the sterno-mastoideus muscle. Independent of its being sensibly raised by each pulsation of the arteries, it obeyed the motions of deglutition, and in a slight degree impeded the passage of the solid aliment. The patient, earnestly desiring to get rid of such an inconvenient deformity, determined to submit to its extirpation, which ap-

peared her only resource. The danger, the length of time, and the pain necessarily annexed to the operation, were not concealed from her. The operation, after a few day's previous preparation, was performed in the amphitheatre by Desault in the following manner: the patient being laid on her back, a little inclined on the left side, with the head and neck more raised than the rest of the body, the surgeon made a longitudinal incision through the middle of the tumour, beginning one inch above, and finishing one inch below, to allow room to finish the operation with ease; in the first section he cut down as far as the gland, dividing the integuments, the platysma-myoides, and some fibres of the sterno-hyoideii and sterno-thyroideii muscles; an assistant, with the view of fixing the tumour, drew towards the left the inside edge of the wound made by the incision, whilst the surgeon detached it from the sterno-mastoideus muscle. In dissecting the cellular substance which united the parts, two small arteries were divided, which were raised by a pair of dissecting forceps and secured by ligature. The external surface of the tumour being thus disengaged, the internal part was detached in the same way. The tumour was drawn outwards by means of a hook, that it might be separated with more ease from the anterior part and from the side of the trachea. In the course of this dissection, the branches of the thyroid arteries were successively tied, as fast as they were divided. The assistant, to whom the hook was confided, directed the gland from within and forwards, whilst the surgeon finished the dissection outwards and from above downwards. This part of the operation was the most minute and difficult: it was necessary by means of a sponge continually to wipe away the blood, which necessarily prevented the parts from being easily distinguished, and obliged the surgeon to divide but a little at a time, and previously to feel with his finger those parts he was about to incise. By this cautious dissection of parts, the superior and inferior thyroid arteries were laid bare, and afterwards secured by ligature by means of a blunt crooked needle. They were afterwards transversely divided, and the remaining part of the tumour detached from the trachea, to which it strongly adhered. The wound resulting from this operation was near three inches in depth: it was outwardly bounded by the sterno-mastoideus muscle, and inwardly by the trachea and œsophagus; posteriorly by the carotid artery, and by the nerves of the eighth pair, which were exposed at the bottom of the wound. After the wound was well washed with warm water, and cleared from the blood, it was filled with coarse lint, powdered with colophony; square compresses, secured by a bandage moderately tight, formed the rest of the dressing. The extirpated tumour was five inches in circumference; and on examination was found to differ in no particular from schirrous glands, except that in the centre there was a cartilaginous nucleus. The patient supported this long, difficult, and painful operation with uncommon firmness: she passed the rest of the day without experiencing any other symptom than a slight shivering, generally consequent to large wounds. The following night she complained of a sense of heat in the neck, and some difficulty in deglutition. The next day a little ease was obtained by moistening the dressing with a decoction of marshmallows. A weak drink of the herb dog's tooth, acidulated with oxymel, was prescribed. On the third day the fever was very moderate, but the difficulty in swallowing had considerably increased at this period; the compresses and the external lint were removed, and fresh applied. On the fourth, the fever ceased, and deglutition became less painful. Suppuration now became established. The next day all the lint was detached, and the whole of the dressings renewed. The wound was in a good state: it was dressed with soft lint and compresses moistened with an emollient decoction; a practice which was continued for the following days. No particular circumstance occurred during the cure. The wound followed the ordinary progress, and was cicatrized at the end of a month. The patient left the hospital, perfectly cured, the 34th day after the operation. (See *Desault's Parisian Chirurgical Journal*, *Vol.* 2, *p.* 292—296.)

To the preceding case, the editor has annexed the few following reflections:

The extirpation of the thyroid gland is an operation extremely difficult, and certainly highly dangerous, when performed by an operator but moderately exercised in the practice of his profession. The number and size of the arteries necessary to divide, the proximity of the trachea, œsophagus, and carotid, near which the knife must necessarily pass, are the principal dangers that the operator should avoid. These are the circumstances which have deterred the majority of practitioners from performing it, particularly those who from long established prejudice have been deterred from using ligatures in cases of wounded arteries. Examples of this operation are very rare. The first time that Gooch undertook to perform it, he was deterred from finishing it by the hemorrhage, and his patient died on the eighth day. The second time he succeeded better, but was incapable of

securing the vessels, and succeeded in stopping the hemorrhage, which would otherwise have been mortal, by causing the parts to be compressed by the hand of an assistant for the space of eight days. (*Gooch's Med. and Chir. Obs. p.* 130; *Bell's System of Surgery, vol.* 5, *p.* 525; *and la Bib. Chir. de Richter, t.* 2. 4*e partie, p.* 128.)

A. F. Vogel and Theden have practised the same operation with the most complete success. All danger from the hemorrhage, or inconvenience arising from the discharge of blood, may be obviated by pinching up the small vessels, tying them as fast as they are divided, and by discovering and tying the large vessels previous to their division; other parts that cannot be wounded without danger, are to be avoided by dissecting slowly and a little at a time, and feeling with the finger every part previous to its division with the bistoury.

TIBIA, ABSCESS OF. (See *Caries*, and *Spina Ventosa.*)

TIC DOULOUREUX. A painful affection of the nerves of the face, particularly, of the filaments of that branch of the fifth pair, which comes out of the infra-orbitary foramen.

A cure has sometimes been accomplished by cutting down to, and dividing, the nerve, at the place where it emerges on the cheek. In other instances, this has been done, and the relief has only been of a temporary nature.

Similar affections of the nerves may also take place in other situations, besides the face. Mr. Abernethy relates an example, in which a lady became gradually affected with a painful state of the integuments under and adjoining to the inner edge of the nail of the ring-finger of the left hand. No injury to the part was remembered which could have brought on this disease. The pain occurred at irregular intervals, and was extremely severe during the time of its continuance, which was for a day or two, when it usually abated. Accidental slight injuries always occasioned great pain, and frequently brought on those paroxysms, which however occasionally occurred spontaneously, or without any evident exciting cause. In all these particulars, the disease correctly resembled the tic douloureux of the nerves of the face. As the pain increased, the disorder seemed to extend up the nerves of the arm. After the patient had endured this painful affliction for seven years, she submitted to have the skin, which was the original seat of the disorder, burned with caustic. This application gave her intense pain, and, on the healing of the wound, she found her sufferings rather augmented than diminished by this experiment. After four more years of suffering, she consulted Mr. Abernethy, when the circumstances of the case were such as to render an operation indispensably necessary. The pain of the part was intolerable, and it extended all up the nerves of the arm; and this general pain was so constant during the night, as to deprive the patient of rest. The muscles of the back of the neck were occasionally affected with spasms. The integuments of the affected arm were much hotter than those of the opposite side, and sometimes the temperature was so increased as to cause a burning sensation in them. Under these circumstances, Mr. Abernethy did not hesitate to divide the nerve of the finger, from which all this disorder seemed to originate. He laid it bare by a longitudinal incision of about three quarters of an inch in length, from the second joint of the finger, and divided it opposite to that joint, by a curved sharp-pointed bistoury, which was conveyed under it. He then took hold of the nerve with a pair of forceps, and reflecting it downwards, removed a portion of it, half an inch in length, that the possibility of a quick reunion might be prevented. The wound was brought together by sticking plaster, and it united by adhesion; but, the upper part of the wound, opposite to the upper end of the nerve, became slightly inflamed, and was very painful. However, the appearance of inflammation gradually went off in the course of three weeks. After the operation, Mr. Abernethy pinched the originally affected integuments sharply with his nails, without causing any sensation; but if, in so doing, he moved the finger, then pain was felt. Mr. Abernethy found it difficult to convince the patient, that the skin at that part was actually devoid of sensation, for she still continued to feel similar sensations to those, which formerly occurred, though in a much diminished degree: but she became gradually as perfectly convinced as any medical man could be, that these sensations arose from the irritated state of the end of the nerve, above the place where it was divided. The painful affection of the nerves of the arm still continued, though considerably lessened in violence; however it was sufficiently severe to make the patient apprehend, that little permanent benefit would arise from the operation. This pain continued occasionally about four months with varying degrees of severity, but the temperature of the skin was not hotter, than that of the opposite side, as it had been before the operation. At the expiration of three months, the patient ascertained, that the integuments at the end of the finger actually felt when any thing was applied to them, and this proved a new source of alarm. Mr. Abernethy

adds, that more than nine months have now elapsed, since the performance of the operation, and the general pains in the nerves have become very trivial; but, the sensation of the integuments at the end of the finger, has during that time gradually increased, and the skin has now its natural sensibility, so as accurately to distinguish the tangible properties of any body applied to it. If also the originally affected part be compressed slightly, painful sensations resembling those which formerly occurred, take place. (*Abernethy's Surgical Observations.*)

Mr. Lawrence lately mentioned to me a case resembling the former, and which was the consequence of a wound of the finger. This gentleman also cut down to the nerve, and removed a portion of it, with every appearance, at present, of permanent relief.

TINCTURA CANTHARIDIS. (*lyttæ.*) Surgeons sometimes employ this medicine, in cases of gleets, and those of incontinence of urine, arising from a want of proper action in the sphincter vesicæ muscle, the due power of which it seems to restore. The usual dose is from ten to forty or sixty drops, twice or thrice a day; but its effects should be vigilantly attended to; for it is apt to occasion dangerous inflammations of the urinary organs, and violent stranguries and retentions of urine.

Tincture of cantharides has also been sometimes employed as an injection for exciting inflammation, in old, chronic, callous, fistulous sinuses, with a view of curing them. Laying them open with a knife, however, is now universally preferred by all the best surgeons.

Tincture of cantharides has occasionally been used as an ingredient in various liniments, and external applications, when the object has been to stimulate the skin, rouse the action of the nerves of the part, or that of the absorbents. In this manner it has been made use of by surgeons in some cases of ptosis, paralysis, &c.

TINCTURA FERRI MURIATI. For an account of the manner of making it, see the *London Pharmacopœia*. The writer of the Pharmacopœia Chirurgica remarks, that the tinctura ferri muriati has sometimes been exhibited "for gleets; but a more important use has been assigned it by Mr. Cline, who orders it in dysuria, when a consequence of *stricture*, in the dose of ten drops every twenty or thirty minutes. This relaxes the spasm, through which the retention is occasioned, by a mode of operation not easily explained.

"Mr. Justamond's liquid for external use in cancers, and which the original inventor called his *panacea anticancrosa*, partook considerably of the nature of this tincture, which, indeed, with an equal quantity of spirit of wine, was sometimes substituted for it.

"Lastly, it is remarkably efficacious in destroying venereal or other warts, either used alone, or diluted with a small proportion of water."

TINCTURA THEBAICA. ℞. Opii purificati ℥ij. Cinnamomi, Caryophyllorum, sing. ℥j. Vini, albi lib. j. These are to be macerated, without heat, for a week, and then filtered.

This was one of the formulæ of the old London Dispensatory, and though the tinctura opii is now substituted for it in that work, yet, in one particular surgical case, it is found that the tinctura thebaica cannot be superseded by the other preparation, without great disadvantage to the patient: I allude to inflammation of the eyes. Mr. Ware has found the tinctura thebaica, in this instance, eminently serviceable. His plan has been to put one drop of it into the eye, once or twice a day, according as the symptoms are more or less violent. When first applied, Mr. Ware remarks, that it causes a sharp pain, accompanied with a copious flow of tears, which continues a few minutes, and gradually abates; after which a greater and remarkable degree of ease generally succeeds. This gentleman observes, that "the inflammation is often visibly abated by only one application of this tincture; and many bad cases have been completely cured by it in less than a fortnight, after every other kind of remedy had been used for weeks, and sometimes months, without any success. But this speedy good effect is not to be expected in all cases indiscriminately. In some, the amendment is more slow and gradual, requiring the tincture to be made use of for a much longer time; and a few instances have occurred, in which no relief at all was obtained from its first application. In cases of the latter kind, in which the complaint is generally recent, the eyes appear shining and glossy, and feel exquisite pain from the rays of light. However, notwithstanding these symptoms, the application is sometimes found to succeed; and whether it will or not, can only be determined by making the trial; which is attended with no other inconvenience than the momentary pain it gives. When it is found to produce no good effect, the use of it must be suspended, until evacuations, and other proper means, have diminished the excessive irritation; after which, it may again be applied, and bids equally fair for success, as in those instances, in which it never disagreed.

If two or three drops of the thebaic tincture are applied at once to the globe

of the eye, the pain they occasion will be considerably greater than if they are placed in the inner angle of the eyelids, and made to glide gradually on the eye, by gently drawing down the lower lid. At the same time that this latter mode of applying the tincture is much less painful than the former, Mr. Ware has found, in a great variety of cases, that it is equally beneficial. (See *Ware's Remarks on Ophthalmy, &c.* his *Additional Remarks* on the same subject; and the article *Ophthalmy* in this Dictionary, at which part of the book, the particular cases, in which the application can be judiciously made, are pointed out.) The reader should be well apprised, that the tinctura thebaica cannot be made indiscriminate use of, for all inflammations of the eyes, without doing serious mischief in many instances.

TINEA CAPITIS. A disease, so named from its eating away the skin, in the manner that a moth (in Latin *tinea*) does various substances. The *Scaldhead*. Termed also *Achor*, or *Achores*, a Greek word, said to be derived from αχυη, bran, and applied to this disorder, in consequence of the branny scales which are thrown off the part affected.

Tinea capitis consists of small ulcerations which originate on the scalp, more particularly in children, and discharge a viscid secretion. The disease begins by small vesicles, which rise above the level of the skin, which now becomes very manifestly red. The little vesicles burst, ulcerate, and emit a secretion, which, is at first fluid, but afterwards dries more or less, so as to become of a thicker consistence, and form scabs. Several of these scabs becoming connected together, form very large ones, of various degrees of thickness, and when these fall off, others of a similar nature are soon produced in the same situation.

Some writers assert, that the seat of this disease is in the sebaceous glands, which now pour out an increased quantity of their secretion, which is said to be of a thicker, and more acrimonious nature, than natural. This theory, however, rests unsupported by any evidence or facts. There certainly is no relative proportion, between the preternatural quantity of matter secreted, and the glands to which its secretion is ascribed. Besides, it is well known, that the scabs frequently form in situations not remarkable for being furnished with sebaceous glands.

Authors have distinguished two species of the tinea capitis. One affects children at the breast, and makes its appearance promiscuously on every part of the head, on the forehead, temples, and even the lips. This case is considered as the most benign, and, when cleanliness is attended to, gets well of itself.

The other species of tinea is of a more inveterate nature, and the matter which it produces is said to be much more irritating than that of the preceding form of the disease. The ulcerations, attendant on it, have occasionally penetrated down to the cranium, and even rendered it carious; an event, however, which is described as being exceedingly uncommon, except in children of very unhealthy constitutions. One may reasonably infer also, that whenever the disease attains so high a pitch, there must have been great neglect. The second kind of tinea capitis sometimes affects children after they have been weaned, and even persons who have attained the age of puberty.

The causes of tinea capitis are very imperfectly understood. Some writers have imputed them to a scrophulous constitution; but, I cannot discover any reason for this doctrine, except that some of the great number of scrophulous children, always to be met with, are affected with the scaldhead. However, so they may be with many other disorders, which no man, in his sound senses, would suspect to be at all connected with scrophula. One of the greatest sources of error among medical men, in the investigation of the causes of disease, is their continually forgetting that two of the kind abovementioned may happen quite independently of each other, in the same person, and that there is no reason, why tinea capitis, as well as the itch, a chancre, and many other affections, should not occur in a patient manifestly strumous. What I conceive to be a clear proof that scrophula is not a cause of tinea capitis, though it may certainly influence its progress, is, that the latter is a very common disease in countries, in which scrophula is scarcely ever seen. One thing, which is decidedly very conducive to the occurrence of tinea, is uncleanliness, and it is on this account, that the disease prevails most among children of the lower classes of society. Poor-living seems also to have some share in keeping up, at least, if not in inducing the complaint. But, there are some circumstances, relative to the causes of tinea, with which we are not at all acquainted; for, the disorder now and then happens in children which are taken the greatest care of, being well fed, and carefully washed and cleaned, every day. The tendency of the tinea capitis to spread, is easily explained, by the secretion among the roots of the hair, having the power of communicating the morbid action to every part of the surface of the scalp, with which it is allowed to come into contact.

The principal objects, in the treatment of tinea capitis, are to soften and take

away as many of the scabs as possible; to cover the subjacent ulcerations with suitable applications; to keep the scalp closely shaved; and in very obstinate cases, or unhealthy subjects, to prescribe proper alteratives.

In order to fulfil these indications, the best plan is to have the hair cut, and shaved off the whole of the affected part of the head, and also off a good deal of the surrounding surface. The scabs are next to be softened by rubbing them well with fresh butter, and as many of them taken away as possible. This being accomplished, let the head be next washed with some strong soap-suds and a flannel; and the common turpentine soap is the best for the purpose.

The scalp having been dried, is afterwards to have applied to it an ointment, consisting of the unguentum picis, and the unguentum sulphuris, mixed together in equal proportions, and spread upon a piece of bladder, or green oil-skin, which latter substance alone will, when aided by properly washing the parts, effect a cure of itself.

The dressings are to be changed every day, and the parts shaved, and well washed with strong soap-suds equally often. Cleanliness, indeed, has astonishing effect in curing tinea capitis.

I have met with instances, however, which resisted the foregoing plan, and, also, the application of the unguentum hydrargyri nitrati, hellebore ointment, &c. The cases in question, however, always yielded to the employment of a lotion composed of a dram or two of the kali sulphuratum, dissolved in a pint of lime-water. Linen, wet with this solution, was kept constantly applied to the parts, which were shaved and washed as often as is above recommended.

Some very obstinate cases demand the exhibition of internal medicines. Small doses of calomel alone, or conjoined with cicuta, may be tried. However, the most successful alterative is Plummer's pill, taken once or twice a day, according to circumstances.

TINNITUS. (from *tinnio*, to tingle.) A noise or ringing in the ear; a symptom of some diseases.

TOBACCO. The use of this plant in surgery is for promoting the reduction of strangulated hernia. For this purpose it is employed either in the form of a fluid glyster, or of smoke, which latter is introduced up the rectum by means of an apparatus constructed for this object, and sold in the shops. Excepting the operation, the power of tobacco, particularly, when assisted with the topical application of cold to the tumour, is most to be depended upon in bringing about a return of the protruded viscera into the abdomen. (See *Hernia*, and also *Enema*.)

TONICS. (from τονω, to strengthen.) Medicines which strengthen.

TONGUE, DISEASES OF. This part is subject to various diseases, as ulcers, tumours, and such enlargements of it as sometimes put the patient into imminent danger, and claim the practitioner's utmost attention.

Carious teeth, having points and inequalities, occasioning incessant irritation, are the most frequent cause of ulcerations of the tongue. The sores, thus produced, often resist every kind of remedy, and ignorance of the cause sometimes leads the practitioner to consider them as incurable; whereas, a cure might easily be effected by extracting the carious tooth, or simply filing off its sharp irregularities and pointed parts. The advice just delivered, is exceedingly ancient, and is the subject of a chapter in Celsus, who has treated of the diseases of the tongue.

The glandular papillæ which are situated on the dorsum, or upper surface of the tongue, are naturally formed with a narrow base, and a broad termination or head, like a mushroom. They are capable of becoming considerably enlarged, so as to form preternatural tumours which may be very improperly mistaken for cancerous excrescences.

A young man, eighteen years of age, had on the middle of his tongue, a circumscribed tumour, about as large as a middle-sized nutmeg. M. Louis, who was consulted, perceived that the swelling was only of a fungous nature, and he tied its base with a ligature, with the noose of which he contracted the diameter of the pedicle, while, with the ends, he kept down the tongue. Then, with one stroke of a pair of curved scissars, he cut off the tubercle. M. Louis afterwards applied caustic, with the requisite precautions, to the base of the tumour, and the patient got perfectly well in five or six days. (*Mémoires sur les Maladies de la Langue, dans les Mémoires de l'Acad. de Chirurgie, Tom.* 5.)

Morgagni speaks of these tubercles, which occasionally form on the tongue; but he had never advised their extirpation, not even when they had become hard and scirrhous; for, though he had not deemed the operation impracticable, he had had no confidence in the skill of the surgeons, who would have been employed. (*De Causis et Sedibus Morborum.*)

The tongue is occasionally affected with a true cancerous disease; one of the most afflicting cases, indeed, to which mankind are exposed. M. Louis saw a lady, who had an ulcerated cancerous tubercle on the left edge of the tongue. The little

swelling was circumscribed; its size did not exceed that of a filbert; the pains were lancinating; the sore had penetrated deeply; and its tuberculated edges were affected with a scirrhous hardness. Extirpation of the disease seemed to present the only chance of freeing the patient from the terrible disorder; but, she refused to accede to any thing but palliative plans, and she died in the course of a few months.

Forestus makes mention of four women, who were attacked with cancer of their tongues, and died from the ravages of the disease, and hemorrhage. In the writings of Fabricius Hildanus, there is a description of the origin and progress of a cancerous tubercle on a young man's tongue, who had a most intolerable fetor of the breath, and died, suffering the most excruciating pains. The same author informs us of another case, exhibiting the good effects of sedative remedies in palliating a cancerous ulcer of the tongue, and the fatal consequences of an opposite line of conduct. In authors, many other examples, of the same kind, are to be met with.

Surgery, however, is not destitute of resources against diseases of so formidable a nature. The following case will serve to shew, what benefit may be effected by this useful profession, when not exercised by men of too timorous a character.

An elderly woman had on her tongue an ulcerated hardness. It had been several times removed with a knife, and as repeatedly returned. Ruysch was called in to a consultation with one of the surgeons, who was attending the patient, and who had already extended his incisions very deeply in removing the disease. The result of their deliberations was another attempt to extirpate the tumour, and they also determined, that after it was cut away, the actual cautery should be freely applied, with a view of destroying the roots of the fungus. The patient consented to the plan, and bore the operations in question with great fortitude. The tongue was taken hold of with a cloth, and Pierre Le Memnonite, a surgeon of eminence, removed the disease with a curved bistoury. The inside of the mouth was then protected with wet cloths, and the actual cautery applied, several times to the wound in the tongue. The pain was appeased, and the separation of the eschar promoted by emollient gargles. The place soon healed, with the aid of what were called vulnerary decoctions, containing honey of roses, and the tincture of myrrh and aloes.

It is much easier to cut off a complete portion of the tongue, through all its diameter, than to remove a cancerous ulceration, situated on one of its edges.

In both cases, there is a good deal of difficulty in fixing it; for it is so very moveable, that it is not easy to keep it in a steady position. M. Louis recommended, for this purpose, the employment of forceps, with blades which terminate in hook-like extremities. With this instrument, the part of the tongue to be amputated can be kept from slipping away from the operator.

Cruel as the operation of removing the tongue may appear, we should not hesitate to perform it, whenever the disease has made a certain progress, and is decidedly of a cancerous nature.

It should be noticed, however, that very malignant ulcers on the tongue have sometimes been cured by milder means. Very bad sores of this description are reported to have yielded to the repeated application of leeches under the tongue, after a vast number of remedies had been tried in vain. In the *Encyclopédie Méthodique, Art. Langue*, there is an account of a very alarming affection of the tongue, (reputed to be cancerous, though this may be doubted,) which got completely well under a very simple plan of treatment. A woman, thirty-five years of age, subject to cutaneous diseases, and ill-conditioned ulcers, complained, for seven or eight months, of little swellings, accompanied with heat and pain, which made their appearance on the edge, and towards the apex, of the tongue. At length, the part affected began to swell, grow hard, and cause lancinating pains. Its surface became irregular and rough; and all the side of the tongue was considerably swelled. The patient could not put her tongue out of her mouth, nor swallow any thing except liquids; and her breath was intolerably fetid. Various sedative remedies had been employed without success. Cicuta had been used as a topical application; it had been exhibited internally in large doses; the patient had taken, for a long while, the corrosive sublimate; but nothing proved of any avail. At length, the patient was so tired of trying the effect of medicines and applications, that she gave them up entirely; and contented herself with trying the experiment of keeping some honey continually in her mouth. As this method seemed to give her some ease, she was prevailed upon to persist in it, and, in this way, the pains were gradually appeased; the swelling was diminished, and, at the end of two or three months, the woman got quite well, except that an indurated cicatrix remained on the part affected, and considerably obstructed the extension of the tongue on that side.

On this case, however, it might be remarked, that the retardation of the cure seems also ascribable to the injury of the health produced by the hemlock, mercury, &c. and that the amendment, following their discontinuance, might arise from the consequent improvement of the patient's health.

Many writers have confirmed the fact, that very inveterate diseases of the tongue are sometimes cured by hemlock. In the work, last cited, is mentioned an instance of a very unhealthy-looking ulcer, near the apex of the tongue, attended with a considerable thickening of the part, and of some duration, which affection was cured by giving large doses of cicuta.

However, notwithstanding many facts of this kind on record, medicines should not be tried too long, that is to say, so as to let the disease extend so far as not even to admit of being cut away. When the disease makes progress, the knife should be employed, before it is too late.

When any part of the tongue is to be amputated, the surgeon is to be prepared for putting a stop to the hemorrhage. Authors very properly recommend the chief vessels to be tied, if possible; but, when this cannot be accomplished, they advise the employment of astringent gargles, such as a strong solution of alum, distilled vinegar, or diluted sulphuric acid. When these methods fail, the actual cautery is advised as the only resource. Some surgeons, however, impressed with the horror of red-hot irons, might think it better to tie the trunks of the lingual arteries, as they pass over the os hyoides. A patient should undoubtedly never be suffered to die of bleeding, and some bold step ought certainly to be taken; but, I cannot presume to decide, which of the two latter measures is the best. Perhaps, with a practitioner, well acquainted with anatomy, the last one should be preferred.

The whole of the tongue sometimes inflames, and becomes considerably enlarged, either spontaneously, and without any apparent cause, or in consequence of some other disease; or else from some particular irritation; such as that of mercury, or some poisonous substance. Slegel, a German physician, who was at Paris about the middle of the 17th century, saw a patient in a salivation, whose tongue became so enormously enlarged, that the mouth could not contain it. Pimprenelle, an eminent surgeon of that time, was sent for, and finding that all trials to relieve the affection had been in vain, amputated one half of the tongue, with a view of preventing it from mortifying. When the wound was healed, it is said, that the patient could articulate as well as before. M. Louis, from whom this fact is quoted, very justly remarks, that the measure resorted to by M. Pimprenelle was an exceedingly violent one; for he has often seen urgent symptoms occasioned, during a salivation, by a rapid and enormous swelling of the tongue, very quickly yield to bleedings, purgative glysters, change of air, and leaving off mercury.

Trincayellius mentions two women, who had considerable enlargements of their tongues. One of these patients, who was young, had been rubbed with mercurial ointment even on her head; and the other, who was about fifty years old, had her tongue attacked with the ravages of the small-pox. The excessive swelling of the tongue, in both these instances, terminated in resolution, and a separation of its outward membrane.

When the urgency is such, that an immediate diminution of the swelling becomes necessary for the relief of the symptoms, nothing, it is said, is attended with so much success, as at once making one or two deep incisions along the tongue. This, it is added, is particularly proved by the cases, inserted by M. de la Malle, in the fifth volume, 4to. of the *Mem. de l'Acad. de Chirurgie*, and by some others, related by M. Louis in the paper above cited. Such cases are extremely interesting, and seem to merit an insertion in this Dictionary.

A man, who was recovering from a bad fever, was suddenly attacked with a pain in his tongue, followed by a swelling equally large and rapid in its formation. In less than five hours, the part became thrice as large, as it is in its natural state; and, in this space of time, M. de la Malle, who had been consulted, had bled the patient successively in his arm, neck, and foot. The man felt very acute pain; his skin was excessively hot; his face was swelled; his pulse was hard and contracted; and his look wild. He could hardly breathe; the tongue filled all the cavity of the mouth, and protruded out between the lips. In this very urgent case, the surgeon had recourse to no other expedient, than keeping the mouth a little more open than it was made to be by the swelling of the tongue, and making with a knife three parallel incisions along this organ, one along its middle, and the other two between the one in the centre and the edges of the part affected. The cuts extended through two-thirds of the preternatural swelling, and had all the good effect, which could possibly be desired. There was a great deal of hemorrhage, and the enlargement of the tongue subsided so much, that, an hour after the operation, the patient was able to speak. The next day, the incisions had the ap-

pearance of being only superficial scarifications, and the tongue was in its natural state. In short, the incisions healed in a few days, the patient having merely made use of a simple gargle.

M. de la Malle quotes several other cases, all of which tend to shew the success, which he has met with in applying this practice to other similar cases. He confirms his own sentiments, by quoting the testimony of some authors, antecedent to him, who have recommended the method. The following case is taken from Job à Meckren, an eminent Dutch surgeon, who lived about the middle of the seventeenth century. This author relates, that a sailor's wife, who, for three, or four days, had experienced a great dryness of her throat, was suddenly threatened with suffocation by a quantity of humour, which she made efforts to expel. The tongue, the tonsils, and the whole palate, soon became swelled. Gargles, poultices, and glysters, produced no effect. It was not deemed advisable to bleed the patient, because the tumefied parts had a whitish appearance, and the swelling did not seem to be of an inflammatory nature. Purgative glysters; scarifying and cupping on the nape of the neck, and between the shoulders; and blisters behind the ears; were recommended, with a view of promoting, what the old surgeons implied by the term, *derivation*. Such remedies did not lessen the disease; on the contrary, it manifestly continued to grow worse, and the livid colour of the tongue, and adjacent parts caused a fear of mortification. Meckren called into consultation François de Vicq, a very experienced surgeon, who acknowledged, that he had never seen any similar case in the whole course of his practice. He advised blood to be taken away from the arm, and raninal veins, which latter operation was effected with a good deal of difficulty. The breathing became at first a little more easy; but, as the symptoms still continued to be alarming, it was determined to make a long and deep incision on the tongue, to the right and left. A good deal of blood was discharged; the respiration was immediately relieved; the swelling diminished; the facility of speaking returned; and, at length, all the symptoms disappeared in an unexpected manner. The sirop of roses and purlain served as a liniment for the wounds, which soon got well.

It may be concluded from the preceding cases, that making incisions into the tongue would have saved numerous patients, who have been suffocated, in consequence of enormous enlargements of this organ. In the small-pox, the tongue sometimes became immensely swelled; and, it is more than probable, that, in many instances, the employment of the above method would have afforded great relief to patients, whom the disease has been known to have entirely bereaved of the power of swallowing. (See *Mémoire sur les Maladies de la Langue, dans les Mémoires de l'Acad. de Chirurgie, Tom. 5. Mem. de M. Malle; same Work. Encyclopédie Méthodique, Partie Chirurgicale, Art. Langue.*)

TONSILS. (dim. of *tolæ*, the kernels.) *Tonsillæ. Amygdalæ.* The tonsils, like all the other parts at the back of the mouth, are subject to different kinds of swelling, which vary as much in their nature as their consequences. Some are rapid in their progress, and these are frequently observed to affect persons of, what is termed, a sanguineous temperament. They are also prone to attack young people, and such as labour hard, and they have all the essential characters of inflammation.

Other swellings of the tonsils are slower in their progress, occur in damp cold weather, and in indolent, and, what the old physicians used to call, phlegmatic constitutions.

Lastly, another kind of enlargement of the tonsils, which is usually contagious, readily falls into a sloughing, gangrenous state, sometimes extends to the neighbouring parts, and too often proves fatal. Hence, the various species of angina have been named by some writers inflammatory, catarrhal, and gangrenous. The two first kinds frequently terminate in resolution; but, sometimes, the affected tonsils afterwards assume a scirrhous hardness, obstruct respiration and deglutition, so that it becomes indispensably necessary, either to extirpate the diseased parts with the ligature, or the knife.

The cutting away of enlarged tonsils was an operation, which was performed by the ancients, and, in different ways. Sometimes, they tore with their fingers the membrane covering the tonsil, and then pulled this part out of the situation, which it occupies between the two pillars of the velum pendulum palati. In other instances, in which they experienced too much resistance, they seized the diseased tonsil with a kind of hook, and then cut it away with a bistoury, which, Paulus Ægineta informs us, was concave on the side towards the tongue.

The moderns, who, for a long while, were timid in the employment of both these methods, adopted plans of a more cruel description. The actual cautery was proposed, and some partial success, which followed its use, at once established its reputation. Caustics were afterwards employed, instead of actual fire; but, the inconvenience of not being able to limit their action, and the hazard of their fall-

ing down the œsophagus, soon caused them to be relinquished by all rational practitioners. Then the operation of cutting away the tonsils was revived, and it was performed, sometimes in the manner of the old surgeons, sometimes with various kinds of curved scissars, or knives. Instead of the simple tenaculum used by the ancients, a sort of double one came into fashion. Every practitioner seemed to regulate the choice of his instruments, by his own ingenuity; and an operation, which was capable of being done at once, became complicated by being divided into several processes.

Bichat describes the following plan, as the common one practised at the present day.—The patient being conveniently seated, the surgeon is to open the mouth very wide, and depress the tongue with any flat instrument, which is afterwards to be committed to the care of an assistant. The operator is then to take hold of the diseased tonsil with a tenaculum, and with a common scalpel, having the back half of its blade covered with rag, he now removes as much of the tonsil, as ought to be taken away. In common cases, it is deemed sufficient to cut on a level with the pillars of the velum pendulum palati. If any other portion should require removal, this should next be performed. The operation being finished, the patient is frequently to wash his mouth with proper gargles.

The preceding plan seems a very simple and easy one, and was, for a long while adopted by Desault. It is said, however, to be liable to one objection, which is, that, when the end of the knife is conveyed far into the mouth, it may do mischief, not (as has been alleged) to the internal carotid artery, the backward situation of which completely keeps it out of all danger of being wounded, but to the membranous covering of the palate, in a place not corresponding to the tonsils. Desault thought this objection was the more forcible, as when the hook is introduced into the tonsil, the danger of the above mischief is considerably increased by a general spasm, which seems to affect every part of the mouth. Hence, this eminent surgeon used to employ, for cutting away diseased tonsils, an instrument, which was first invented for dividing cysts of the bladder. The contrivance consisted of a sharp-edged blade, which was included in a silver sheath. The latter had at its extremity a kind of notch, in which the gland, which was to be extirpated, was received. The rest of the instruments were similar to those used in the operation above described. Desault used to proceed, as follows:

1. The patient being seated on a high chair, with his head supported on an assistant's breast, the surgeon is to make him open his mouth very wide, and the lower jaw is to be kept thus depressed, by any solid body placed between the teeth, and held there by an assistant.

2. The tongue is to be kept down with a broad spatula.

3. The surgeon is next to take hold of the tonsil with a double hook, with which he is to raise and draw it a little towards him. He is then to take the above cystitome, and put the tonsil in the notch, on a level with the place, where the incision is intended to be made.

4. When the portion, which is to be cut off, is engaged in the notch, the operator is to draw the part towards him, so as to stretch it, and press the instrument against it from below upward. The blade being next pushed across the notch, the necessary section is accomplished. When the division is not complete, which is particularly liable to happen, when the diseased gland is of considerable magnitude, the blade is to be drawn back, and the section completed by applying the instrument to the wound, which it has already made. Even a third application may possibly become requisite on some occasions.

5. The patient is to be directed to wash his mouth. Bichat states, that this plan of operating, adopted by Desault, is equally simple and easy as the method above related, with the advantage of being safer. Such is the construction of the blade of the instrument, that when it slides across the notch, it presses against, and steadily fixes the parts, which are to be divided; an advantage which neither the knife nor scissars have, before the action of which the parts are quite moveable. Hence, there is difficulty in cutting them. When the introduction of the instrument from above downward, is difficult, it is better to withdraw it; and, after turning the notch in the opposite direction, pass it from below upward. In general, however, the first of these methods is preferable, because the gland, when half cut through, cannot now fall back and obstruct the rima glottidis, so as to bring on danger of a sudden suffocation; a circumstance which Wiseman and Moscati have seen happen. With a view of preventing this occurrence, M. Louis recommended the common scalpel to be used, with its edge directed upward, as has been advised for the above instrument; which latter contrivance, however, being, according to Bichat's account, more easy and safe, merits the preference. Besides the advantage of fixing the soft parts, which are to be cut, it has that of not contusing them, like most other instruments of this nature, as, for instance, scissars. The oblique disposition of its blade makes it divide parts, in the manner of a saw.

The above contrivance, as Bichat allows, is certainly increasing the number of surgical instruments; a thing, which all the best modern surgeons endeavour to avoid. But, as this author remarks, this instrument is not exclusively applicable to any particular operation. It may be employed for cutting away the tonsils and uvula; dividing membranous fræna in the rectum, vagina, and bladder; amputating fungous excrescences, polypi of the nose, (if this mode of extirpating them were preferred) and various tumours in general, which are deeply situated in different cavities of the body, where instruments introduced unguardedly might injure parts which should be avoided, or where the base of the tumour should be steadily fixed, when its division is to be accomplished. The latter object cannot safely be effected by scissars. When the base of the tumour is too large to be received in the notch, one part is first to be divided, and then another, till its whole thickness is cut through.

The ligature, as a means of extirpating enlarged tonsils, is, in general, only proper for timid patients, who will not have the knife employed, or whose fears are such as would baffle the operation with a cutting instrument. Tying the tonsils is more tedious, and not at all less painful, than cutting them away, and always creates a vast deal more irritation. Moscati having once adopted this plan, very severe pain and inflammation ensued; the difficulty of swallowing and breathing compelled him to amputate the tumour at the place where the ligature was applied, and all the bad symptoms immediately ceased. Besides, when the ligature is used, the oozing of blood cannot take place from the ends of the cut vessels, and which tends so much to diminish the inflammation. The base of the swelling is also commonly broader than its upper part, and does not admit of being properly surrounded with a ligature. And, when it has a narrow base, it can then be so easily removed with a cutting instrument, or with Desault's instrument, and with so little pain, that one of the last modes is always preferable.

The ligature, however, has had its advocates. Heister recommends it, in certain cases; Sharp praises it; and others approve its use, and the plans of employing it have been as various as the inventive genius of the different partisans of the practice. Some make use of Levret's double cannula, which is furnished with a silver wire noose, in which the tumour is to be engaged. By twisting the instrument, the diseased part becomes constricted; and this plan being repeated every day, the circulation is intercepted, and the gland mortifies, and sloughs away. Some, after putting the noose of a ligature over a kind of tenaculum, hook hold of the tonsil, push the ligature over the enlarged gland, which they tie, without having any means of increasing the constriction every day. Some employ Belloque's instrument for putting the ligature over the tonsil. Others require no instrument whatever for the purpose, and accomplish the business with their fingers.

Passing over a more ample historical detail, we need only observe, that two inconveniences generally attend all the above plans. Some of them do not admit of the constriction being afterwards increased, and, therefore, are apt to prove insufficient. Indeed, this is usually the case; and it becomes necessary to apply another ligature. Others of the above methods, free from this objection, are attended with the inconvenience of leaving in the mouth too large a body, which is very annoying. The repeated twisting of the wire, also, sometimes makes it break, and renders another operation indispensable, which is much more painful than the first one.

In order to obviate these inconveniences, Desault employed an instrument, which the French call *un serre-nœud*, which is an exceedingly simple thing, being, in fact, nothing more than a long, narrow, round piece of silver, terminating at one end in a little ring, or hole, and, at the other, in a kind of groove or notch. Desault sometimes employed the same instrument for tying nasal polypi, and tumours in the vagina, and rectum.

The following was this celebrated surgeon's method of extirpating the tonsils with a ligature.

1. The patient is to be seated on a high chair, with his head held back, on an assistant's breast; his mouth is to be opened very wide, his tongue depressed, and the diseased tonsil taken hold of with a double hook.

2. The surgeon takes the *serre-nœud*, in which a ligature has been passed, so as to form a noose. The noose is to be put over the handle of the hook, which is to be committed to the charge of an assistant, and the noose then pushed over the tonsil, so as to embrace it completely.

3. The surgeon is now to draw the ligature strongly towards him, and push forward the *serre-nœud*, so as to produce the requisite constriction of the tumour. In general, the ligature should not be made very tight the first day.

4. When the constriction is such as it ought to be, the double-hook is to be withdrawn, and the ligature twisted round the notch, at the outward end of the instrument.

5. The next day, the gland becomes unusually large, in consequence of the im-

pediment to the return of the venous blood. The ligature is to be unfastened from the notched end of the instrument, and drawn more out, so as to increase the constriction. When this is sufficient, the ligature is to be again twisted round the notch. This plan is to be followed up, till the tumour is detached, which usually happens on the fourth or fifth day.

The method just described, is more simple, than those described in Paré, Fabricius Hildanus, Scultetus, &c.; but, as Bichat and Desault recommended, the knife, if possible, should always be preferred to the ligature. (*Desault par Bichat, Tom.* 2.)

I shall conclude this article with observing, that the best modern practitioners in this country, prefer a common knife to any other instrument, for the performance of this operation.

TOPHUS. (said to be derived from a Hebrew word.) A swelling, which particularly affects a bone, or the periosteum. See *Node*.

TORCULAR. (from *torqueo*, to twist.) A tourniquet. See this word.

TORMENTIL. (from *tormentum*, pain, because it is said to relieve the toothach.) *Tormentilla Erecta. Linn.* The root of this plant is exceedingly astringent, and, on this account, is sometimes employed in affections arising from atony, and a relaxation of certain parts. It has been used for making astringent poultices, in cases of prolapsus of the anus, and also of that of the vagina. In relaxations of the uvula, and scorbutic affections of the gums, gargles, made with tormentil, are said to have proved useful. Fomentations, prepared with this plant, have been recommended, as being very serviceable for relieving the weakness of joints consequent to sprains.

TORTICOLLIS. (from *torqueo*, to twist; and *collum*, the neck.) The wry-neck. See *Wry-neck*.

TOURNIQUET. (*French*, from *tourner*, to turn.) An instrument used for stopping the flow of blood into a limb, until some requisite operation has been performed, or some more permanent plans of checking hemorrhage, have been put in practice.

The old surgeons used to surround the limb with a band, with which they made such a degree of constriction, that the circulation was quite stopped. These practitioners also believed, that the pressure of the band was advantageous, by benumbing the limb, and moderating the pain of operations.

The violent pain and contusion, however, which this tourniquet occasioned, being frequently followed by mortification and abscesses, surgeons endeavoured to devise some other method of checking hemorrhage. The application of the circular band was first improved, so that it caused less pain, and less mischief to the skin. The limb was surrounded with a very thick compress, over which the band was placed. Two small sticks were next put under the band; one on the inside, the other on the outside of the limb; and they were twisted till the band was rendered sufficiently tight. It is in this manner, says Dionis, in his *Traité d'Opérations*, that carriers tighten the cords which fasten the bales of goods in their carts. A French surgeon, named Morel, is said to have made this first improvement in the application of tourniquets.

M. Petit, in 1718, presented to the Academy of Sciences, a tourniquet of his own invention, which was much more perfect, than any one ever contrived before. It consists of two pieces of wood, one of which is superior, the other inferior. The inferior piece is about four inches and a half long, and nearly two broad. Its under surface is somewhat concave, while its upper one is a little convex, and the ends are hollowed out. From its middle part rises a round eminence, about seven lines high, and eight and a half broad. The superior piece is almost the same as the inferior one, just described, but rather shorter. The eminence, which ascends from its middle part, is six lines high, and an inch and a half in diameter. This eminence is hollow within, and calculated to receive a wooden screw, the top of which is a sort of button for turning the screw. The grooves of Petit's screw were about four, or five, and each of them four lines in diameter, in order that a half turn might produce the necessary effect. Lastly, all the pieces of the instrument were fastened together by an iron pin, which went through the middle of the two pieces of wood, and through the whole length of the screw. This iron pin is rivetted under the inferior piece, and at the top of the button, in such a manner, however, that the screw is capable of turning on it, as on a pivot.

In order to apply this tourniquet, the limb is to be surrounded with a double strap, about four finger-breadths wide, and made of chamois leather, which is the softest material which can be used. To one end of the strap a double little cushion is fastened, of the same length and breadth as the lower piece of the tourniquet. A narrow compress, or cylindrical pad, is also requisite, for the purpose of compressing the track of the vessels. This compress consists of a very firm roll of linen, covered with chamois leather. The ends of a piece of tape are sewed to the outer part of the pad, and

thus the tape leaves a passage for the leather strap. By this artifice, the pad can be moved to any situation on the strap, which is most convenient, according as the bulk of the limb may require. The middle of the tape is to be fastened to the outside of the leather strap. The cylindrical compress, or pad, is to be put over the course of the vessels. The double cushion is to be placed on the opposite side of the member, while the leather strap is to surround the limb in a circular manner. All the different pieces of the apparatus are next to be retained by the tape, which is to be tied at the side of the cushion.

The tourniquet is now to be put over the cushion, on that side of the limb which is furthest from the track of the large vessels, and is to be fastened in this situation by a double band, with a hole in it for the reception of the upper part of the screw.

In order to make the proper compression, the screw is to be half turned round, from the right to the left. The upper piece of the tourniquet, becoming now further from the lower one, the double band draws the pad, and presses it against the vessels, so as to make the due degree of compression.

The following are the advantages, attending the use of Petit's tourniquet: 1. It compresses the lateral parts of the limb less, than the tourniquet previously in use. 2. It requires the aid of no assistant, either to hold, tighten, or loosen it. 3. The operator is able of himself to stop the flow of blood in the artery, by means of the screw. 4. When there is any danger of hemorrhage after an operation, this kind of tourniquet may be left on the limb, and, in case of the bleeding coming on, the patient, if no one be at hand, can tighten the instrument himself, as much as is necessary. 5. The constriction, which this tourniquet produces, does not create any danger of mortification, because it does not altogether stop the flow of blood through the collateral arteries.

The tourniquet just described, is certainly very complex, when compared with the one used by the best modern practitioners; but, still it is the original of the latter, and both are constructed on the same principles. All the pieces of modern tourniquets are kept connected together, and instead of two pieces of wood, used by Petit, there is contrived a brass bridge, which is capable of being elevated, or depressed, by means of a screw, made of the same metal. Over this bridge a very strong band proceeds, and by passing under two little rollers, at each end of the bridge, it always remains connected with the instrument. A convex firm pad is sewed to the band, and put immediately over the artery, where the instrument is applied. There are no cushions for the opposite side of the limb under the screw; but a thick piece of leather, through which the band proceeds in two places, is always situated under the lower surface of the brass, and serves to prevent any bad effects of its pressure. It is usual also for the surgeon to fold some rag, and put it in this situation, at the time of applying the instrument. (See some other remarks on the tourniquet, in the article *Hemorrhage*.)

TRACHEA. (from τραχυς, rough.) The wind-pipe, so named from its asperities. For an account of its wounds, see *Throat*.

TRACHELO'PHYMA. (from τραχηλος, the throat, and φυμα, a tumour.) A wen, or tumour on the throat.

TRACHEOCE'LE. (from τραχεια, the wind-pipe, and κηλη, a tumour.) A tumour on the trachea.

TRACHEOTOMY. (from τραχεια, the wind-pipe, and τεμνω, to cut.) *Tracheotomia*. The operation of cutting an opening into the wind-pipe for various surgical purposes. See *Bronchotomy*.

TRACHO'MA. (from τραχυς, rough.) A roughness on the inner surface of the eyelids.

TRAUMATICS. (from τραυμα, a wound.) *Traumatica*. Medicines, or rather applications, which promote the healing of wounds.

TREPAN. (from τρυπαω, to perforate.) *Trepanum*; *Terebellum*; *Modiolus*. An instrument, which is intended for sawing out circular portions of bone. Before a more convenient instrument, named the trephine, came into use, surgeons commonly employed the trepan in various injuries of the head. (See *Head, Injuries of*.) It is nothing else, in short, than a cylindrical saw, and it only differs from the trephine, in having a different kind of handle.

TREPHINE. The instrument now commonly preferred for perforating the cranium, for purposes which we shall presently explain. It consists of a simple cylindrical saw, with a handle placed transversely, like that of a gimblet; and, from the centre of the circle, which the teeth of the saw describe, a sharp little perforator projects, named the centre-pin. The upper part of the centre-pin is made to screw in a corresponding hole at the inside of the top of the saw, and is capable of being taken out, or put in, at the surgeon's option, by means of a little key for the purpose. Its use is to fix the trephine, when it is first applied, that is, before the teeth of the instrument have made a sufficient circular groove, in which they can steadily work. When

this has been accomplished, the centre-pin must always be removed; because now it is not only not needed, but, if left, it would retard the progress of the operation, and inevitably wound the dura mater and brain, when the teeth of the saw had cut to a certain depth through the cranium. My trephines, which I bought of Mr. Savigny, have their centre-pins contrived to slide up, or down, and to be fixed in either position by turning a little screw. This method seems to me both ingenious and convenient.

The cylindrical part of the trephine is often termed the *crown* of the instrument. The surgeon should always have at least two, or three cylindrical saws of various sizes; for, it is always a commendable rule never to saw away any more of the cranium, than is absolutely requisite for the accomplishment of some assignable object. There is no occasion, however, for having more, than one handle, which may be made to screw on any of the saws.

Trephines are also occasionally applied to other bones, besides those of the cranium. In the articles *Antrum*, *Caries*, *Exostoses*, *Spina Ventosa*, and *Fractures of the Sternum*, other cases are mentioned, in which the employment of these instruments sometimes becomes proper.

It is certainly not always desirable to remove a complete circular portion of the cranium; the taking away a piece of smaller size, and of a different shape, would frequentlybe much more advantageous. Some surgeons, I understand, who object to removing any unnecessary quantity of the cranium, have been in the habit of employing a trephine, terminating only in a semi-circular, instead of a circular saw, by which means, they can often cut across the base of a depressed portion of the skull, and take it away, without any occasion for removing also a circular piece of bone. An instrument of the latter kind may certainly be sometimes found useful.

The saws, however, which Mr. Hey has described, should constantly be kept in every case of trephining instruments. This practical writer remarks, that "the purposes, for which any portion of the cranium is removed, are, to enable the surgeon to extract broken fragments of bone, to elevate what is depressed, and to afford a proper issue to blood or matter that is, or may be confined, &c.

"When a broken fragment of bone is driven beneath the sound contiguous part of the cranium, it frequently happens, that the extraction cannot be executed without removing some of the unbroken part, under which the fragment is depressed. This might generally be effected with very little loss of sound bone, if a narrow portion of that, which lies over the broken fragment, could be removed. But such a portion cannot be removed by the trephine. This instrument can only saw out a circular piece. And as, in executing this, the central pin of the saw must be placed upon the uninjured bone, it is evident, that a portion of the sound bone, greater than half the area of the trephine, must be removed at every operation. When the broken and depressed fragment is large, a repeated application of the trephine is often necessary, and a great destruction of sound bone must be the consequence.

"When the injury consists merely of a fissure with depression, a small enlargement of the fissure would enable the surgeon to introduce the point of the elevator, so as to raise the depressed bone. But a small enlargement of the fissure cannot be made with the trephine. When it is necessary to apply the elevator to different parts of the depressed bone, a great deal of the sound cranium must be removed, where a very narrow aperture would have been sufficient.

"The same reasoning will apply to the case of openings, made for the purpose of giving a discharge to extravasated blood, or matter.

"If a saw could be contrived, which might be worked with safety in a straight, or gently curvilineal direction, it would be a great acquisition to the practical surgeon. Such a saw I can now with confidence recommend, after a trial of twenty years, during which time, I have rarely used the trephine in fractures of the skull. Its use has been adopted by my colleagues at the General Infirmary in Leeds; and will be adopted, I hope, by every surgeon, who has once made trial of it." Mr. Hey next informs us, that the instrument was first shewn to him by Dr. Cockell, of Pontefract; but that there is a saw, formed on the same principle, in Scultetus's Armamentarium Chirurgicum. The saws alluded to, are very short ones, fixed at the end of a longish straight handle; their edges are made either straight, or semi-circular. The latter construction qualifies the instrument for cutting in a curvilineal direction, which is often proper. The edge of the saw should always be made a little thicker, than the rest of the blade, by which means it will work in the groove, which is cut, with more facility.

Saws, made on the principle just described, are also of infinite use in cutting away diseased portions of other bones, besides the skull, exostoses, &c. In cases of necrosis, when a dead part of a bone is quite wedged in the substance of the surrounding new bony matter, Mr. Hey's saws may often be advantageously employed for cutting away the parts, which

mechanically prevent the detachment of the dead piece.

Besides trephines of various sizes, and the saws just now noticed, the surgeon should also take care to have in his case of instruments for this operation, a little brush for occasionally cleansing away the particles of bone from the teeth of the saw, in the progress of the operation; a pair of forceps adapted for extracting the round piece of bone after it has been detached by the saw; a lenticular for removing any inequalities, which may present themselves, round the sawn edge of the cranium, after the circular piece is taken out; a raspatory for the same purpose, and, also, for scraping the bone in order to see whether it will bleed, which is a circumstance in some cases very important to be attended to; (see *Head, Injuries of*;) a largish common scalpel for dividing the scalp, &c.; and some elevators for raising depressed pieces of bone.

The common elevator is now generally used by all the best English surgeons; but, several others have been proposed, as, for instance, the tripod elevator; and another one, invented by M. J. L. Petit, and afterwards improved by M. Louis.

The common elevator is a kind of lever, bent in two different directions, and the ends of which are made rough, in order that they may not easily slip away from the piece of bone, which is to be raised. This instrument may be used by forming a fulcrum for it in the hand, which holds it; or else by making a fixed point for it on the edge of the opening, made with the trephine, or of that, which the accidental violence has occasioned. In the first case, the instrument cannot be employed with much force; the hand may give way; or the elevator may slip away from the bone, against which it presses, and thus occasion a considerable concussion. In the second case, the parts, on which the instrument is placed, may be forced inwards.

These inconveniences led to the invention of the three-footed elevator, which consists of three branches uniting above into one common trunk. This part of the elevator is pervaded by a long screw, having below a kind of hook, and above a sort of handle for turning it. It is with the hook, that the depressed portion of bone is to be elevated. This part of the instrument is to be introduced into the opening, made in the cranium, as soon as the elevator has been put in a proper position, and it is to be made to ascend by turning the screw. Formerly, the tripod elevator was also sometimes used conjointly with a short screw, which was first fixed in the piece of bone to be elevated, and then drawn upward by placing the hook of the elevator in a ring, which was attached to its upper part. Those surgeons, who invented the three-footed elevator, were well acquainted with all the objections to the ordinary one, and they endeavoured to obviate them, by procuring a firmer fulcrum, and more power. But it was necessary to change the situation of their elevator, as often as there was occasion to raise a different portion of bone, and the hook, also, being connected with an inflexible piece of steel, the direction of which was always the same as that of the instrument, it was troublesome and difficult to place the hook under the piece of bone, which required being raised.

Such were the reasons, which induced M. J. L. Petit to invent a new elevator. This is a lever mounted on a handle, and straight, throughout its whole length, except just at its very end, which is slightly curved, in order that it may be more easily applied under the bone, which one wishes to elevate. The lever in question is pierced, at various distances from its bent end, with several holes, intended for the reception of a little kind of moveable screw-peg, fixed on the top of a sort of bridge. This latter part of the instrument is a kind of arch, the ends of which are long, and covered with little cushions. In the middle of the bridge is the moveable screw-peg already mentioned. Petit wished the peg to be joined to the bridge, by means of a hinge; and, as he often found it necessary to elevate several different pieces of bone in the same wound, he thought that the little screw should not be completely fastened in the hole; but, that the instrument should be capable of being turned to the right, or left, or to any point of the cranium. However, a screw is an inclined surface, which revolves round in a cylindrical cavity; consequently, when the fulcrum, formed by the bridge, is once placed, and (instead of moving the elevator directly upward) one wishes to turn the instrument to the right, or left, it can only be applied obliquely, and, with its edge, under the piece of bone which is to be raised.

M. Louis learnt from experience the inconveniences of Petit's elevator. The former of these celebrated surgeons obviated them by substituting, for the hinge, a kind of joint, for the purpose of connecting the lever with the bridge. This construction, which makes the lever capable of being readily moved in every direction, also adapts it for being put under every point, which may require being raised, and this, without any occasion for changing the position of the bridge, forming the fulcrum. M. Louis also substituted for the screw a pivot.

I have only to repeat, respecting elevators, that all surgeons in this country prefer, what we have called, the common one, which is the most simple, and is found to answer every desirable purpose.

Before beginning the description of the operation, I think it highly proper to remind the reader, of what has been so forcibly dwelt upon in the article *Head, Injuries of*,—that the removal of pressure off the brain, which pressure must also actually occasion dangerous symptoms, can form the only true and vindicable reason for employing the trephine, or sawing away any portion of the skull. There are a very few exceptions to this remark: it may, indeed, be now and then proper to saw away the bony edges, which surround some fungous excrescences, which grow from the dura mater, and make their way outward, by occasioning an absorption of the part of the skull immediately over them. (See *Dura Mater.*) It may also be now and then proper to saw out diseased portions of the skull, though, it must be confessed, that in general their separation might be left to time and nature. To have a proper idea of all the circumstances, in which trephining is indicated, the reader must turn to the article *Head, Injuries of.*

When the operation is determined on, it is more convenient to have the head shaved: indeed, this is often done immediately the surgeon is called, in order that he may have a better opportunity of seeing what parts of the scalp have been struck; for, it is in such situations, that he has most reason to apprehend fractures of the bone, or extravasations beneath it. If, however, the violence has occasioned a large wound, or laceration of the scalp, the practitioner, knowing where the force has been applied, is frequently content with having a little of the hair shaved off the parts surrounding the injury. All that need be said on this subject is, that it is better to have enough of the hair always taken away, to afford the surgeon an uninterrupted opportunity of examining the scalp freely, and doing whatever may be necessary. The loss of a little hair is of very little consequence, while the concealment of the seat of a depressed fracture, or extravasation, might lead to fatal consequences.

When the propriety and necessity of trephining are fully indicated by circumstances and symptoms, explained in the article, *Head, Injuries of*, provided the wound, or laceration of the scalp, should not have exposed a sufficient surface of the bone for the application of the crown of the trephine, an adequate dilatation of such wound ought immediately to be made. If, in the situation of the blow, there should only be a contusion, or a lump, unattended with any wound, a division of this part of the scalp is to be made by carrying the knife quite down to the bone. In those cases, in which the swelling, occasioned by the violence, is considerable, and attended with the sensation of a crepitus; as well as in other instances, in which there is only a contusion, under which a fracture and displaced pieces of bone may be felt; the scalp must be divided in the same manner, only with greater caution, lest the point of the knife should insinuate itself through the fracture, and do mischief to the dura mater and brain.

Authors recommend the shape of the incision to be different according to the kind of fracture, and the parts of the head, on which the violence has operated. When the whole extent of the injury can be brought into view, by means of an incision, having the form of a letter T, the surgeon should be content with such a division; but, if this be not sufficient, he may render it a crucial one. When the trephine is to be applied to the squamous part of the temporal bone, we are recommended to make the incision, as much as possible, in the shape of the letter V, the branches of which are to be upward, and the angle downward, in order that as little as possible of the temporal muscle may be cut, and that the division of its fibres may be avoided as far as it is in our power.

Having divided the scalp, the next object is to reflect it; but, no man would be warranted in cutting any part of it away, although such practice is advised by Pott, and many other eminent writers. The purposes of the operation do not require any removal of this kind; and the method would leave a wound, which would be long in healing, and, when healed, never exempt from deformity. In short, the reflected flaps of the scalp are capable of adhering to the parts, on which they are laid, after the operation, and, consequently, ought never to be wantonly cut away.

The scalp being reflected, authors next advise us to scrape away the pericranium, either with the knife, or the raspatory. Perhaps, this measure may be considered as one, which does neither much harm, nor much good. The design is to facilitate the application of the trephine to the bone. However, the teeth of a proper instrument, in good order, will not be impeded by the slender periosteum; and scraping this membrane away from parts of the skull, which are not to be removed, must be conducive to exfoliations.

Sometimes, the bleeding from branches of the temporal, or occipital artery, is so copious, that the bone cannot be very conveniently perforated before the hemorr-

hage is suppressed. If it be prudent to wait a little, and the case (as it generally does) should be likely to be benefited by the evacuation of blood, it is as well to let the bleeding continue for a certain time. The surgeon may then just direct an assistant to put the end of one of his fingers on the mouth of the vessel, and proceed in the operation. In some cases, the bleeding might be so troublesome, that it would be better to tie the artery at once.

All parts of the cranium do not admit of being trephined with equal convenience and safety. It has usually been set down by surgical authors, that the trephine cannot be applied below the transverse ridge of the os occipitis. There are some cases, however, which prove that such an operation may be safely done, and that we ought not, in urgent circumstances to be afraid of dividing the trapezius and complexus muscles, in order to be enabled to apply the trephine to the bone. (See *Hutchinson's Case in Medico-Chirurgical Transactions, Vol.* 2, *p.* 104, *&c.*)

The majority of writers also forbid us applying the trephine to the frontal sinuses, in consequence of the indeterminate depth of these cavities, and the apprehension of incurable fistulæ. M. Larrey, however, has deviated from this precept in two instances, and his practice confirms the statement of Mr. C. Bell, that by opening the frontal sinus with a large trephine, and then using a small one, the internal parietes of this cavity may be trephined with perfect safety, and no risk of injuring the dura mater with the saw. (See *Larrey's Mém. de Chirurgie Militaire, Tom.* 2. *p.* 136—138.)

Writers also caution us not to apply the trephine to the anterior inferior angle of the parietal bone, in consequence of the middle artery of the dura mater lying under it, generally in a groove of the bone, and occasionally in a canal in its very substance. In the latter circumstance, this portion of the parietal bone could not possibly be taken away, without wounding the vessel. However, notwithstanding this advice, which has been unthinkingly handed down by one writer to another, from generation to generation, I very much question the soundness of the doctrine. We undoubtedly ought to avoid trephining this part of the cranium, when we can prudently do so. But the causes demanding this operation are always so urgent, that the patient's sole chance of existence depends on their quick removal. Hence, were there pressure on the brain, either from a depressed portion of bone, from blood, or matter, and such pressure could not be removed without trephining the anterior inferior angle of the parietal bone, what operator would be afraid of doing so? Besides, the fear of the hemorrhage has been very unfounded; for, the lodgment of the artery in a bony furrow, or canal, which authors have pointed out, as rendering the suppression of the hemorrhage more difficult, is a mere visionary idea, as it is well known, that a little plug of lint, pushed in the orifice of a vessel, so situated, will always stop the bleeding, with as much certainty and ease as can possibly be imagined.

The foregoing suggestion was made in the early editions of my works, and I now see the safety of the practice has been confirmed. "I have also applied the trepan (says M. Larrey) over the track of the spheno-spinous artery, at the inferior anterior angle of the parietal bone. The artery was divided; but, I stopped the hemorrhage almost immediately, by applying an iron probe red hot." (*Mém. de Chirurgie Militaire, Tom.* 2, *p.* 138.)

Writers, until very lately, also prohibited us from trephining over any of the sutures, and, especially, over the sagittal suture, beneath which the longitudinal sinus is situated. The fear of the dura mater being injured, and of this vessel being wounded, was the reason for the advice. With regard to the sutures in general, the trephine may be applied to them, as well as to any other part; and, as for the sagittal suture, many facts confirm the propriety of not being deterred even by it, though situated immediately over the longitudinal sinus. It is to be remembered, also, that the dura mater, in cases of extravasated blood, and matter, beneath the cranium, is detached by the intervention of such fluids from the inner table.

By means of a perforation practised over the sagittal suture, Garengeot successfully elevated a portion of bone, which pressed upon the longitudinal sinus, and made the patient quite comatose. The depressed piece of the cranium could not have been so advantageously raised, had the trepan been applied in any other situation. But a still stronger argument, in favour of this practice, when the case at all requires it, is the fact, that wounds of the longitudinal sinus, and the hemorrhage resulting from them, are not attended with any serious danger. Sharp mentions his having twice seen a bleeding of this kind. Another instance is also recorded in Warner's Cases. A child received a wound on its forehead: the two parietal bones were fractured, and a portion of each was depressed on the dura mater.

The child lived a month, without any operation being done; but, at the end of this time, Warner applied the trepan. He found a splinter of bone sticking in such a way in the longitudinal sinus, that it could not easily be got out; consequently, he enlarged with a lancet the opening, in which the splinter was entangled. The hemorrhage, which was copious, was easily suppressed by the application of a little dry lint, and the child was relieved, though it died at the end of two months, after suffering a variety of symptoms, which had no connexion with the wound of the sinus, the opening of which soon healed. The fourth case, related by Marchettis, also confirms, that wounds of the longitudinal sinus are not fatal. Pott has since recorded other facts, tending to the same conclusion.

Whenever a depressed fracture can be elevated to its proper level, without applying the trephine, and with the mere aid of a pair of forceps, or an elevator, trephining should never be performed, unless there should be reason to apprehend, that blood, or matter, lodged on the surface of the dura mater, contributes to the occurrence of the bad symptoms, and ought to be discharged.

The scalp having been divided, if necessary, and the pericranium scraped from the surface of the bone, according to the common precepts, and practice, the next thing is the application of the crown of the trephine.

The surgeon is first to make a little impression with the point of the centre-pin, for the purpose of shewing the place, where it will work, when the crown of the trephine is applied in the proper situation; for, where such impression is made, the operator must make a small hole with a perforator, in order to fix the point of the centre-pin, on which the crown of the instrument turns backward and forward, as on an axis, during the first stage of the operation. Mr. Savigny's centre-pins make a perforation, without need of any particular instrument for the purpose, and, in this respect, are advantageous.

The point of the centre-pin having been fixed, the trephine is to be turned, by regular semicircular motions, alternately to the right and left, which object is effected by steady pronations and supinations of the operator's hand. The teeth of the saw having made a tolerable circular groove, in which they can steadily work, the centre-pin becomes useless, and, as it would, if not withdrawn, or removed, certainly injure the dura mater and brain, by reason of its projecting further, than any other part of the instrument, it would be an unpardonable blunder to let it remain, after a proper circular groove has been formed by the teeth of the saw.

The beginning of the sawing may be executed boldly and quickly; for, the operator runs no hazard of doing mischief. It is necessary occasionally, with a view of facilitating the action of the instrument, to clean away the particles of bony matter, with a little brush, usually kept for the purpose in every box of trephining instruments. Were this plan neglected, the action of the cylindrical saw would be very much clogged.

The operator, however, must increase his caution, when the sawing has made greater progress; for, were he to be too bold, he might sometimes lacerate the membranes of the brain with the teeth of the instrument, particularly, as the thickness of the cranium is subject to infinite variety, both in different parts of the same head, and in different subjects. Let the surgeon, therefore, never forget to examine frequently with the point of a quill, whether any part of the circular groove is cut through, or nearly so; for, when this is the case, the instrument must only be worked in such a way, as to make pressure upon, and cut, the part of the circle, which yet remains to be divided. In some few cases, it is said, that the surgeon can distinctly feel, when the teeth of the saw reach the diploe, or medullary structure, between the two tables of the cranium, and some writers have rashly directed us to saw with boldness, till the sensation of this occurrence is communicated to our hand and fingers. However, I believe, this possibility of discriminating the arrival of the teeth of the saw at the diploe is so uncommon, and so fallacious, that it should never be expected, or relied on. Nor ought the surgeon to saw with incautious force and rapidity, till he sees the teeth of the trephine bloody, which has been set down as another criterion of their having reached the diploe. I have already stated, that a great many skulls have hardly any space between several parts of the two tables. This is particularly often the case in old persons.

A prudent man will always prefer exerting a little force for the purpose of breaking some of the bony connexion, retaining the circular piece of bone, to running any hazard of injuring the dura mater, by sawing too deeply. After a certain time, therefore, it is better to lay down the trephine, and endeavour to elevate the portion of bone, with the aid of a pair of forceps, constructed for the purpose, and kept in most cases of trephining instruments, or else by means

of an elevator, which is still more calculated for the purpose.

When the circular piece of bone has been taken out, and the edges of the perforation are unequal, and splintered, the irregularities are to be cut off with the lenticular knife. When there is extravasated blood underneath the opening which has been made, it sometimes spontaneously makes its escape, and, if it should not do so, the surgeon should remove it himself. If one perforation of the skull should not suffice for letting out the blood, as much more of the cranium ought to be removed with the trephine, as circumstances may require; there being no comparison between the danger of repeating the application of the instrument, and that of leaving a quantity of undischarged, compressing fluid, on the surface of the brain. Certainly, many facts on record evince, that the dura mater may be very extensively uncovered, without dangerous consequences. Sarrau saw a whole parietal bone exfoliate, in consequence of a blow on the head. Blegny relates a similar case; and Saviard makes mention of a woman, who had lost the upper part of the os frontis, both the parietal bones, and a large portion of the os occipitis, all of which had come away at the same time. The woman, notwithstanding, recovered. Vaugion, however, who also seems to relate this identical case, describes the exfoliation as not being quite so extensive.

I am of opinion, notwithstanding these facts, that exposing a large part of the dura mater with the trephine is, by no means, an operation exempt from serious danger. And, what I conceive confirms this statement, is my having known instances, in which persons, who had been rashly advised to submit to being trephined, for the cure of violent pains in the head, &c. died, in consequence of the operation.

However, I perfectly coincide with writers, who recommend the removal of as much bone, as is requisite, in order to be able to remove the whole of the pressure from the surface of the dura mater.

The application of the trephine, in cases of large extravasations, must in particular be made several times, when the situation of the fluid does not favour its escape. However, in this circumstance, Sabatier says, that we should not make numerous perforations all along the extent of the extravasation; but, only a counter-opening, as is done on the soft parts. This author expresses his surprise at there not being on record many examples of counter-openings made on the cranium, since analogy demonstrates their utility. I cannot help remarking on this part of the subject, that one very obvious objection to making openings of this kind in the cranium, is the impossibility of knowing with certainty, whether blood lies under any particular part of the skull; whereas, in abscesses of the soft parts, the surgeon feels the fluctuation of the matter, and knows, that his counter-opening will be made in the cavity containing it. One might also have occasion to make more than one perforation, in order to discharge blood extravasated beneath the skull, when the blow has happened near a suture, to which the dura mater continues adherent; for, it might happen, that an opening made only on one side of the suture, might only give vent to a part of the extravasation.

If we should not find blood lodged under the cranium; but the dura mater should seem elevated, tense, dark-coloured, forming a prominent fluctuating tumour, outward, it may be cautiously opened with a lancet, or bistoury, with a view to letting out any collection of blood underneath. In the article *Head, Injuries of*, we have stated the result of Mr. Abernethy's experience, in regard to the operation of opening the dura mater. This gentleman found, that the method never effectually discharged all the blood, but only the serous part of it. The evacuation of any of the compressing fluid must, however be desirable; and, if the surgeon cannot do more, yet he has fulfilled his professional duty.

The utility of trephining is not limited to discharging extravasated blood, or matter, lodged underneath the skull. This operation frequently enables us to elevate depressed portions of bone. The latter object can often be accomplished by merely making one perforation. Sometimes, several perforations are requisite to be made near each other. Authors even state, that it may also become necessary to remove the intervening portions of bone with a pair of cutting forceps. The depressed part may then be easily raised by means of an elevator. Occasionally, indeed, I may say, very often, the best practice is to remove the depressed portion entirely, when its entire separation from the rest of the skull can be accomplished by cutting across the base of the depressed piece. If any splinter stick in the dura mater, and not admit of being withdrawn, without enlarging the wound in the membrane, the surgeon should not be afraid of doing this with a sharp instrument.

The operation being completed, the flaps of the scalp are to be laid down, and a little soft lint applied, covered with a pledget of simple ointment. The

lighter the dressings are, the better, and no bandage will serve for retaining them so well, as a common elastic night-cap.

The practitioner should not now conceive, that he has done all that he ought to do. Let him remember the urgent necessity of keeping off, or diminishing, the inflammation of the dura mater and brain, which is to be feared. Let him bleed the patient largely and repeatedly; exhibit saline purges, glysters, and antimonials; and, if the symptoms continue, let him apply a blister to some part of the head. I shall avoid, however, any repetitions on this subject, by referring to *Head, Injuries of.*

The reader may find an account of the operation of trepanning, or trephining, in every system of surgery; but, he should particularly consult the writings of Sharp, Le Dran, Dionis, Bertrandi, Pott, and Sabatier, which latter writer has materially assisted me in the preceding article. Several parts of the *Mémoires de l'Acad. de Chirurgie* are also highly deserving of perusal.

TRICHIASIS. (from Θριξ, the hair.) *Entropeon.* Scarpa distinguishes two kinds of this disease; in one the eyelashes incline inward, without any change in the natural position of the cartilage of the eyelid; in the other, the edge of the latter part turns in a preternatural manner inward, and, of course, the cilia point towards the eyeball.

Scarpa describes the first species of trichiasis, as being exceedingly uncommon. Indeed, he adds, that he had never seen, but one such example, and in this only some of the hairs were distorted inward. The common kind of trichiasis is the second one, or that, in which both the tarsus and eyelashes are preternaturally turned inward at the same time. The disease may either be complete, so as to interest the whole of the eyelid, or incomplete, when only the edge of the tarsus takes a wrong position. One eyelid alone may be affected, or both, and occasionally the eyelids on each side are thus diseased.

Scarpa considers the *distichiasis*, or species of trichiasis, said to arise from there being two rows of hairs on each eyelid, as merely imaginary; and he reminds us of what Winslow and Albinus have explained, that notwithstanding the roots of the eyelashes seem to be arranged only in one line, the hairs themselves, by separating from each other, may seem to form several rows; while their insertions do not deviate in the least from the common, natural arrangement. (See *Distichiasis.*)

It is not easy to determine exactly the causes which sometimes make a few of the eyelashes deviate from their natural direction, while the position of the eyelid itself is not at all altered. The causes are generally imputed to scars on the tarsus, in consequence of previous ulceration, which makes the hairs fall off, and hinders others, which grow, from assuming a proper direction. However, this cause is not the only one; for, Scarpa has seen an instance, in which two, or three hairs grew inward against the eyeball, notwithstanding the tarsus had no ulceration, nor cicatrix whatever upon it.

Scarpa says, he is inclined to think, that the little ulcers and scars, which sometimes form on the inner edge of the tarsus, would occasion the second species of trichiasis, or an inversion of the edge of the eyelid, and consequently of the cilia against the eye, rather than the first species of the affection. As such ulcers eat deeply into the part, and, when neglected, destroy the substance of the lining of the eyelid near the tarsus, it necessarily happens, that as the sores gradually cicatrize and contract, they draw inward the tarsus, and even the hairs implanted into it. Since the little ulcers in question do not always extend all along the edge of the tarsus; but, are occasionally confined to a few lines in its centre, or near the outer angle, all the eyelashes do not incline inward after cicatrization, but, only a few of them, which correspond to the extent of the ulcers, which were formerly situated along the inner edge of the tarsus. Indeed, in all cases of imperfect trichiasis, caused by a cicatrix on the inside of the eyelid, it may readily be seen, that the tarsus and the eyelashes are in their natural position, except opposite the place, where the ulcers on the inner edge of the eyelid were previously situated. If the eyelid be turned out, its lining, near its edge, corresponding to the seat of the trichiasis, will be found pale, rigid, and callous, and, it will be obvious, that the inversion of its cartilaginous edge, and the faulty inclination of the eyelashes against the eyeball, originate from the contraction of that part of the inside of the lid.

Besides these causes, there are some others, which are capable of producing the same bad effect. First, the inveterate chronic ophthalmy, which gradually grows worse and worse, (such as the scrophulous, or that arising from the small pox,) and which keeps the integuments of the eyelids, for a long while, in a state of distention and œdema, next induces a relaxation of them, and, the cartilaginous edge of the eyelid, not being properly supported by the skin, falls inward against the eyeball, and draws with it the eyelashes into the same faulty direction. The same bad effect is sometimes produced, independently of any relaxation of

the integuments, by a morbid softening of the cartilage of the tarsus, occasioned by a long-continued, copious discharge from the Meibomian glands. In consequence of this alteration in the cartilage, either the whole length, or only a part of it, becomes incapable of keeping itself erect, and of retaining the curve, which its perfect coaptation with the other eyelid requires. Hence the whole, or a part of the cartilage becomes folded inward, and makes the corresponding eyelashes incline inward against the eye. These causes are not unfrequently found combined together, and they are also often accompanied with cicatrices of the membrane, which invests the inner edges of the eyelid. Some pretend, (says Scarpa, alluding to Mr. B. Bell,) that trichiasis sometimes arises from a spasmodic contraction of the orbicular muscle of the eyelids; but, Scarpa owns, that he himself has never seen such a case, and thinks it scarcely credible, that any spasm of this muscle, however violent, can ever occasion a turning inward of the tarsus and eyelashes. Even were it to have the power of doing so, the spasm could not be a permanent cause of the complaint.

Any one, however little acquainted with surgery, may readily conceive what great inconveniences must be occasioned by the continual friction of the eyelashes against the cornea, and white of the eye. The complaint is generally rendered still more aggravated, by the inverted hairs becoming far thicker and longer, than those, which have not had their natural direction changed. Although the affection may only be situated in one eye, both are usually affected from sympathy, and the sound one cannot be moved, without producing pain in the other, which is irritated by the friction of the inverted eyelashes. Both eyes of persons, affected with trichiasis, are generally exceedingly irritable, and cannot bear much light. In cases of incomplete trichiasis, as the patient has some little power of opening the eyelids in order to see, particularly, towards the inner canthus, his head and neck very often become inclined in an awkward position. This circumstance at last frequently occasions, in children, a wryness of the neck and shoulders, which deformity is very difficult to correct, even after the trichiasis has been completely cured. Children also cannot endure the irritation, produced by the inflected eyelashes, and are continually rubbing the eyelids, which tends very much to aggravate all the bad consequences, arising from trichiasis, particularly, chronic varicose ophthalmy, and opacity and ulceration of the cornea.

The second species of this disease, that is to say, the one which is commonly met with in practice, and which consists in a faulty inclination of the tarsus, and, consequently, of the eyelashes against the eyeball, is cured by artificially turning out the tarsus, and replacing it securely in its natural position, together with the eyelashes, which rub against and irritate the eyeball. Such is the mode of cure, whether the disease has orginated from cicatrices, and a contraction of the internal membrane of the eyelids, near their margin, in consequence of ulcers near the latter part, or whether the disease has been occasioned by a relaxation of the skin of the eyelids, a morbid softening of the cartilage of the tarsus, or all these causes combined together. Cutting off a certain portion of the skin, near the edge of the eyelid, completely fulfils the indication just mentioned. The piece removed should be sufficiently broad and extensive to make the tarsus and edge of the eyelid turn outward, far enough from the eyeball, when the wound has healed, and, in such manner, that the eyelid may find in the cicatrix of the skin, a due support for keeping it in its natural position. Scarpa confesses, that at the present day, after so many fruitless trials, he does not believe, that any surgeons would now entertain any expectation of radically curing the trichiasis, either by merely plucking out the hairs, which assume a wrong position; by bending them outward, and keeping them in this manner, by means of sticking plaster; or by pulling them out, and then touching the situation of their roots with caustic, and even the actual cautery. Scarpa believes, that still less reliance would be put in cutting away with the hairs the edge of the eyelid, or in dividing the orbicularis palpebrarum, from within the eyelid, on the supposition, that trichiasis sometimes depends on a spasmodic affection of this muscle. All these plans, which have been the fruit of theory, have been rejected from practice, as being either insufficient, hurtful, apt rather to exasperate, than cure, the disease, or liable to induce affections of the eyelids, not at all less severe, than the trichiasis itself.

Scarpa remarks, that the most effectual mode of curing this disease, comprehending the method advised by Kokler (*Versuch einer neuen Heilart der Trichiasis; Leipzig*, 1796) and known ever since the time of Rhases, consists, as has been already stated, in the excision of a certain portion of the skin of the affected eyelid, near the tarsus. This operation, when simplified in the manner Scarpa describes, by abandoning the numerous instruments formerly used, and also sutures, is easy

of performance to the surgeon, little painful to the patient, and constantly followed by an expeditious cure.

The patient being seated, if an adult, or placed on a table of convenient height, if a child, with the head raised, and steadily held by an assistant standing behind, the surgeon is to push outward, with the end of a probe, the hairs, which irritate the eye. Then, with a pair of dissecting forceps, or the ends of his forefinger and thumb, (which answer equally well, and, in many cases much better, than forceps,) the operator should lift up a fold of the skin of the affected eyelid, taking great care, that the piece, which is taken hold of, corresponds exactly to the middle of the whole extent of the trichiasis; for, as we have already explained from Scarpa, sometimes the whole, sometimes a half, and, in other instances, only a third of the extent of the tarsus is inverted. The surgeon, with his left hand, must raise the fold of the skin, more or less, according as the relaxation of the integuments, and the inversion of the tarsus, are more, or less considerable. The reason of this is exceedingly evident, viz. that the greater the quantity of skin is, which is raised, the greater is the quantity which will be cut away. Supposing the patient to be an adult, as soon as the fold of skin has been raised in a certain degree, the surgeon must request him to open his eye, and, if in this act, the tarsus and eyelashes resume their natural place and direction, the portion of skin already raised will be sufficient for the purpose. We must trust to our own judgment, with regard to children, as they seldom let us have recourse to the mode of discrimination just related. The forceps of Bartisch, of Verduin, and those improved by Raw, formerly employed, are objectionable, because they raise the skin equally from one end of the eyelid to the other: in consequence of which, too much of the skin must be cut off near the extremities of the eyelid, and not enough in the middle. On the contrary, when the integuments are elevated, by means of a pair of dissecting forceps, and care is taken to lay hold of the skin precisely at the middle point of the whole extent of the trichiasis, it necessarily follows, that the consequent section of the skin will form an oval, and that the greatest width of the wound will correspond exactly, or nearly so, to the middle of the eyelid, and its narrowest parts to the angles, or commissures of the same. This contributes very materially to make the cicatrix correspond to the natural fold of the eyelid, and hinder the origin of a disease of an opposite nature to the one about to be remedied, towards the angles of the eye, viz. an eversion of the commissures of the eyelids. See *Ectropium*.

Besides this caution, relative to the situation and figure of the fold of the integuments to be cut off, the surgeon must be careful, that the division of the skin be made very near the inverted tarsus. Were this circumstance neglected, the operator might have the displeasure of finding, after the wound is healed, that, although the eyelid is shortened, on the whole, from the eyebrow to the place of the recision, yet it is not equally so at the space, which is between the edge of the eyelid, and the cicatrix of the skin. Hence, the tarsus would remain inverted, as before, or not be sufficiently turned outward to keep the eyelashes from rubbing against the eye. This inconvenience would oblige the patient to submit to a second operation, done lower down, than the first.

Things being thus arranged, the surgeon, holding up the fold of skin by means of the forceps, in his left hand, is with a pair of probe-pointed, sharp curved scissars, to cut off the whole of the duplicature, being first sure, that one of the blades of the instrument is applied close to the edge of the eyelid. If both eyelids should be affected, the same operation should immediately be done upon both of them, with such cautions, and, in such proportion, as the extent of the disease, and the degree of inversion inward of each eyelid may require.

Scarpa next dissuades us from employing any suture to unite the wound, and represents, that it will be sufficient to keep the eyebrow as much downward as possible, if the operation has been done on the upper eyelid, or, if on the lower, to support it against the inferior arch of the orbit, by pressing it from below upwards, so as to keep the edges of the wound from becoming separated. Then the lips of the wound are to be put into exact contact, by means of strips of adhesive plaster, which should extend from the superior arch of the orbit to the zygoma, and the support of the wound in apposition will be still more securely effected by placing two compresses, one on the eyebrow, and another on the zygoma, together with the uniting bandage, applied in the direction of the monoculus. See *this word*.

Scarpa seems to think, that surgeons have been led to employ sutures in this case, by seeing, that, after the fold of the skin has been cut off, (as for example, that of the upper eyelid,) the integuments become so retracted towards the eyebrow, and downwards towards the tarsus, that the whole eyelid seems, at the time, to be entirely deprived of skin. But, all

this is only a mere appearance; for, when the eyebrow is depressed by means of compresses and the uniting bandage, the eyelid immediately becomes covered with skin, as before, and the edges of the wound are easily put into contact without any occasion for using sutures. Gendron is one of the few, says Scarpa, who, in these circumstances, prefer strips of sticking plaster to sutures; he had often noticed, that, when sutures were used, a great deal of tension and inflammation followed, and produced a laceration of the points. Scarpa adds, that his own experience has confirmed Gendron's opinion, and that the disuse of sutures has been very beneficial to his patients, and increased the simplicity and expedition of the operation.

On taking off the first dressings, the third day after the operation, the surgeon will find, that the patient can open his eye with ease, and that the inverted tarsus and eyelashes have resumed their natural position and direction. In the partial, or incomplete trichiasis, or that which only occupies a half, or a third of the whole length of the tarsus, and in subjects, who have had the skin of the eyelids very loose, Scarpa has often had the pleasure of finding the wound perfectly united on removing the first dressing.

When, however, only a part of the incision has healed, while the rest seems disposed to heal by suppuration and granulation, the surgeon covers the wound with a small piece of lint, spread with the unguentum cerussæ; and, if the sore should become flabby, it must be touched, every now and then, with the argentum nitratum, until the cure is perfected, which commonly happens in the course of a fortnight.

Thus far, Scarpa's observations have related to the radical cure of the second, or most frequent, kind of trichiasis.

With regard to the first form of this disease, or that, in which the eyelashes project against the eyeball, without the natural position of the tarsus being at all altered (a case, which is fortunately very rare), the accomplishment of a cure is very difficult, since, as we have already explained, neither the pulling out of the hairs, nor burning the situation of their roots, are means at all to be depended upon for producing a complete cure of the disorder; and since, turning the tarsus, out of its natural position, would make the patient liable to an irremediable flowing of the tears over the cheek, attended with a chronic thickening of the lining of the eyelid. The treatment of this species of trichiasis is still imperfectly understood, and seems to claim more attention, than it seems hitherto to have had paid to it. In the instance of this form of the disease, which Scarpa met with, only two, or three of the eyelashes inclined against the eyeball. He found, on turning the eyelid a little out, opposite to the situation of the faulty hairs, that he could not, indeed, completely put them in their natural position; but, he saw, that he could thus remove them so far from the cornea, that they would not rub against it, without altering the position of the eyelids so much as to occasion a perpetual discharge of the tears over the cheek. And, as in the patient alluded to, the skin about the eyelid was very tense, Scarpa deviated from the above rule, by making an incision with the back of a lancet, near the tarsus, three lines long, and he took away a small piece of skin of the same length; but, very little more, than one line broad. When the cut healed, the operation was found to answer as well as the nature of the case would allow, though the cure was not complete, nor would it have obviated all inconveniences in cases of greater extent.

The trichiasis being cured, something more always remains to be done, for the purpose of correcting the cause of the disease, as well as curing the disorder of the eye, occasioned by the previous friction and irritation of the inverted hairs. The usual indications are, to restore the tone of the vessels of the conjunctiva, to lessen the swollen Meibomian glands, and to remove any cloudiness of the cornea. How to fulfil these objects, is explained in the articles, *Cornea, Opacity of;* and *Ophthalmy.*

Scarpa remarks, that the celebrated Albinus is the only writer, that he is acquainted with, who has taken notice of the *trichiasis of the caruncula lachrymalis.* As Scarpa thinks the history of it very interesting, he quotes it in the following terms: "*In subtilibus illis pilis, quos Morgagnus in carunculâ lachrymali animadvertit, trichiasis speciem vidi. Unus eorum increverat præter naturam, crassior longiorque atque ita se incurvans, ut globum oculi extremâ parte attingeret. Consecuta est inflammatio dira, cruciatu tetro, et, quòd causa non intelligebatur, pertinax. Adhibita fuerant quæcumque suggerere ars potuerat, et empiria; collyria, epispastica, purgantia, sanguinis missiones, fonticuli, diæta. Quum nihil proficiretur, fortè itum ad me. In causam, si invenire possem, inquirens, ecce pilus. Quo evulso, subsedit malum.*" (Acad. Annot. lib. 3. cap. 8.) Scarpa notices, however, that Albinus has omitted to mention a very essential circumstance, viz. whether the hair grew again after a certain time, and in what direction. (*Scarpa sulle principali Malattie degl. Occhi;* 1802.)

Dr. Crampton has published an Essay

on the Entropeon, in which he found the following mode of operating very successful in one instance. "Let the eyelid be well turned outwards, by an assistant; let the operator then with a lancet divide the broad margin of the tarsus completely through, by two perpendicular incisions, one on each side of the inverted hair or hairs. Let him then, by a transverse section of the conjunctiva of the eyelid, unite the extremities of the perpendicular incisions. The portion of cartilage, contained within the incisions, can then, if inverted, with care be restored to its original situation, and retained there by small strips of adhesive plaster, or (perhaps, what is better) by a suspensorium palpebræ, adapted to the length of the portion of the tarsus, which it is intended to sustain, should one or two hairs be displaced, without inversion of the tarsus."

The late Mr. Saunders's operation for the cure of trichiasis is described in my other work entitled the "First Lines of the Practice of Surgery," and I do not feel it necessary to repeat an account of it in the present place.

On the preceding subject, consult particularly *Scarpa sulle principali Malattie degli Occhi; Crampton's Essay on Entropeon; Saunders's Obs. on several Practical Points relative to the Diseases of the Eye; Richter's Anfangsgrunde der Wundarzneykunst, Band.* 3.

TRICHISMUS. (from θριξ, hair.) A species of fracture, which appears like a hair, and is almost imperceptible.

TRICHOMA. (from θριξ, the hair.) The disease called the plaited-hair, or plica polonica.

TRICHOSIS. The same.

TRIPSIS. (from τριβω, to bruise.) A contusion.

TRISMUS. (from τριζω, to gnash the teeth.) The locked jaw. See *Tetanus.*

TROCHAR, or TROCAR. (from the French, *trois-quart*, three-fourths, from its point, being of a triangular form.) An instrument used for discharging aqueous fluids, and now and then, matter from different cavities in the body, particularly, those of the peritoneum, and tunica vaginalis, in cases of ascites and hydrocele. Trocars are also employed for tapping the bladder, dropsical ovaries, &c.

A trocar consists of a perforator, or stilette, and of a cannula, which latter is so adapted to the first piece of the instrument, that, when the puncture is made, they both enter the wound together, with perfect ease, after which the stilette being withdrawn, the cannula remains in the wound, and gives a ready passage for the fluid outward.

Such are, the use of a trocar, and the principle, on which it should be constructed. It would be unnecessary in this work to detail every little particularity in the instrument. I shall just observe, that the triangular-pointed trocars seem to retain the greatest share of approbation; for, although flat, lancet-pointed ones enter parts with most ease, their cannulæ are not large enough for readily letting fluids pass out, which are at all thick, gelatinous, or blended with hydatids, and flaky substances.

The trocar, which is used for puncturing the bladder from the rectum, should be eight, or nine inches long, and of a curved form.

Surgeons ought always to have at least three trocars; one of full size; another of middling width; and a third, small one. The latter is often preferable to a larger one, in cases of hydrocele.

TRUSS. (*trousse*, French.) *Bracherium.* A bandage, or apparatus, for keeping a hernia reduced.

Trusses are either of an elastic or non-elastic kind: the latter cannot be much depended upon, and are now seldom employed. The *spring*, is a very essential part of every elastic truss, and it consists of a narrow piece of steel, which is adapted to the side of the body, on which the hernia is situated. The front part of the steel spring has an expanded form, and, when the truss is properly applied, ought to be situated over the mouth of the hernial sac. Under the back surface of the anterior end of the spring is placed the pad, which should be adapted in shape and size to the passage, which it is intended to shut up. The steel spring is usually covered with leather, is lined with soft materials, and, after being put on the patient, it is fastened in its situation by means of a strap, which extends from the two ends of the spring, round that side of the body, on which the hernia is not situated.

When the pad of the truss cannot be kept from rising too high, another strap, passing under the thigh from the back of the spring to its anterior end, becomes necessary. Sometimes, a band, extending over the shoulder, is requisite for keeping the pad from descending too low.

The springs of trusses, intended for children, and persons, who do not undergo much labour and exertion, need not be made so strong, as those designed for hard-working, active people.

The idea, that children cannot wear steel trusses, is as erroneous, as it is dangerous in its practical consequences. Mr. Pott has strongly written against this ill-founded supposition.

When great pressure, and a very strong spring, are found necessary for keeping a hernia securely reduced, and the sperma-

tic cord swells and inflames in consequence of such pressure, it is better to have a little excavation in the pad, for the reception of this part.

Some trusses are formed with pads, which are moveable on a rack, so that their position can be altered, and adapted to the parts, with the greatest ease.

A compress of calico, placed under the pad, is said both to preserve the instrument from the effect of perspiration, and make the truss fulfil its object in a better manner.

Mr. Lawrence has described a new kind of truss, invented by Mr. Whitford, surgeon's instrument maker, near St. Bartholomew's Hospital: "The spring passes on the ruptured side, just below the outer edge of the crista of the ilium, as far as the posterior superior spinous process of that bone. It then goes straight across to the same point of the opposite bone, and pursues its course, on the sound side of the pelvis, in the same relation to the crista ilii, as it held on the side of the rupture, as far as the anterior superior spinous process, where it terminates as usual in a leathern strap. In this mode of construction, the motions of the trunk and thigh cannot derange the instrument, which requires a still further stability from the extension of the spring round the sound side of the pelvis." (*Treatise on Hernia*, p. 41.)

In the article *Hernia*, we have given an account of the truss for umbilical hernia, invented by Mr. Morrison, and described by Mr. Hey. In the same part of this Dictionary may also be found some observations, relative to the place, against which the pressure of the pads of trusses should be directed in cases of inguinal hernia, in conformity to Mr. A. Cooper's description of the situation, at which the parts first protrude from the abdomen.

TUBERCLE. (dim. of *tuber*, a knob.) A little tumour.

TUMEFACTION. (from *tumefacio*, to make swell.) Swelling.

TUMOUR. (from *tumeo*, to swell.) A swelling. In the present article, I merely intend to treat of, what are usually called, sarcomatous and encysted tumours. Mr. Abernethy thinks, that the manner, in which tumours are formed, is best illustrated by those, which hang pendulous from the membranous lining of different cavities. This gentleman adverts to an example noticed by Mr. Hunter, in which, on the cavity of the abdomen being opened, there appeared lying upon the peritoneum, a small portion of red blood recently coagulated. This, on examination, was found to be connected with the surface, upon which it had been deposited by means of an attachment, half an inch long, and this neck had been formed before the coagulum had lost its red colour. (See *Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge*, *Vol.* 1, *p.* 231.) Mr. Abernethy observes, that if vessels had shot through the slender neck, and organized the clot of blood, this would then have become a living part: it might have grown to an indefinite magnitude, and its nature and progress would probably have depended on the organization, which it had assumed. He mentions his having in his own possession a pendulous fatty tumour, which was found growing from the surface of the peritoneum, and which was undoubtedly formed in the same manner as the tumour noticed by Mr. Hunter, viz. by vessels shooting into a piece of extravasated blood, or lymph, and rendering it a living organized substance. Tumours, in every situation, and of every description, are probably formed in the same way. The coagulating lymph being effused, either accidentally, or in consequence of disease, is afterwards converted into a living part, by the growth of the adjacent vessels and nerves into it. Mr. Abernethy remarks, that, when the deposited substance has its attachment by a single thread, all its vascular supply must proceed through that part; but, in other cases, the vessels shoot into it irregularly at various parts of its surface. Thus an unorganized concrete becomes a living tumour, which has at first no perceptible peculiarity as to its nature. Although its supply of blood is furnished by the vessels of the surrounding parts, it seems to live and grow by its own independent powers, while its future structure seems to depend on the operation of its own vessels. Mr. Abernethy conceives, that the altered structure of an enlarged gland affords no contradiction to the above account, as, in this latter case, the substance of the gland is the matrix, in which the matter forming the tumour, or enlargement, is deposited. According to Mr. Abernethy, the structure of a tumour is, sometimes, like that of the parts, near which it grows. Such, as are pendulous in joints, are cartilaginous, or osseous. Fatty tumours, he observes, frequently form in the midst of the adipose substance, and he has seen some tumours growing from the palate, which had a slender attachment, and resembled the palate in structure.

However, this resemblance of the structure of a tumour, to that of the neighbouring parts, is not always observable. I have in my own possession a completely cartilaginous tumour, which I found in the midst of the fat near the kidneys. The pendulous portion of fat, growing from the peritoneum, and mentioned by Mr. Abernethy, serves as another instance

of the fact; and, one might add, that every polypus, which we meet with, bears no resemblance in structure to the neighbouring parts. Mr. Abernethy mentions his having seen bony tumours, which were unconnected with bone, or the periosteum, and, he observes, that the structure of a tumour is, in general, unlike that of the part, in which it is produced.

When the coagulable part of the blood is effused, and the absorbents do not take it away, the surrounding blood-vessels grow into it, and convert it into a vascular tumour. The effusion of the coagulable part of the blood may be the effect of accident, or of a common inflammatory process, or it may be the consequence of some diseased action of the surrounding vessels, which (diseased action) may influence the organization, and growth of the tumour.

In the former cases, the parts surrounding the tumour, may be considered simply as the sources, from which it derives its nutriment, whilst it grows apparently by its own inherent powers, and its organization depends upon actions begun and existing in itself. If such a tumour be removed, the surrounding parts being sound, soon heal, and a complete cure ensues. But, if a tumour be removed, whose existence depended on the disease of the surrounding parts, which are still left, and this disease be not altered by the stimulus of the operation, no benefit is obtained. These parts again produce a diseased substance, which has generally the appearance of fungus, and, in consequence of being irritated by the injury of the operation, the disease is in general increased, by the means, which were designed for its cure. It appears, therefore, that in some cases of tumours, the newly formed part alone requires removal, whilst, in others, the surrounding substance must be taken away, or a radical cure cannot be effected. (*Surgical Observations, by John Abernethy, F.R.S. &c.* 1804.) This gentleman conceives, that the irritation of the tumour itself, when once the swelling has been produced, keeps up an increased action in the surrounding vessels, so as to become a sufficient cause of the disease continuing to grow larger. As the tumour becomes of greater magnitude, it condenses the surrounding cellular substance, and thus makes for itself a sort of capsule. The close, or loose manner in which tumours become connected with the surrounding parts, seems to depend very much on the degree of irritation, and inflammation excited in the circumjacent parts. When a tumour has been at all tender, painful, and inflamed, it is generally found intimately adherent to all the neighbouring parts. Mr. Abernethy conceives, that the increased irritation, which a tumour creates, when it has exceeded a certain size, may explain, why some tumours, which are at first slow in their progress, afterwards begin to grow with great rapidity.

The process, by which tumours are formed, is commonly thought to be attended with an increased action of the vessels, which supply the swellings with blood. It is supposed, in short, to be the same kind of process, which forms all the thickenings and indurations, which, under various circumstances, occur in all the different parts of the human body. It has sometimes been named *chronic* inflammation, to distinguish it from that, which is more quick in the production of certain effects, and is attended with a manifest throbbing in the part affected.

It seems generally to be admitted, that the growth of all tumours may be always retarded, and that sometimes, they may even be diminished by means of topical bleeding with leeches, and keeping the parts in a continually cool state, by the incessant application of cold sedative washes. Afterwards, when the increased action of the vessels seems checked, and the tumour ceases to enlarge, discutients are indicated, such as frictions with mercurial ointment, pressure, electricity, rubefacient plasters, solutions of salts, blisters, and issues. Very few sarcomatous or encysted tumours, however, are ever completely removed by these local means. The swelling, on the contrary, generally increases, notwithstanding them, and the irritation of these diseases by the latter stimulants, is not altogether unattended with danger of the affections becoming changed by them into very malignant, and dangerous ones, sometimes to all appearances, cancerous. The most advisable plan is to recommend the removal of all these tumours with the knife, while they are small, and in an incipient state. For, thus, they are got rid of by an operation, which is, certainly trivial, compared with the one, which may afterwards become requisite, when the disease has attained an enormous magnitude.

Tumours, Sarcomatous. These have been so named, from their firm, fleshy feel. They are of many kinds, some of which are simple, while others are complicated with a malignant tendency. Mr. Abernethy has attempted to form a classification of sarcomatous tumours, for the different species of which he has proposed names, deduced from the structure, which they exhibit on dissection. This gentleman has named the kind of swellings, which he first considers, *Common Vascular*, or *Organized Sarcoma*. Under this title, Mr. Abernethy includes all those

tumours, which appear to be composed of the gelatinous part of the blood, rendered more, or less vascular by the growth of vessels through it. The vessels, which pervade this substance are, in different instances, either larger, or smaller; and more, or less numerous; being distributed in their usual arborescent manner, without any describable peculiarity of arrangement. Perhaps, all the varieties of sarcomatous tumours are at first of this nature. The structure, under consideration, is met with not only in distinct tumours, but, also, in the testis, mamma, and absorbent glands. When a common vascular, or organized sarcoma has attained a certain magnitude, the veins of the skin seem remarkably large, and their winding under the integuments excites notice. This kind of sarcoma is not at all tender, so that it may be freely handled, and also electrified, without giving pain. The tumour sometimes grows to such a size, that the skin bursts, the substance of the swelling sloughs out, and the disease is got rid of. However, this mode of cure is attended with such terrible local appearances, and so much fever, &c. that the removal of the disease with the knife is preferred.

The second kind of sarcomatous tumour, noticed in Mr. Abernethy's classification, is the *Adipose Sarcoma*. Every one, at all in the habit of seeing surgical diseases, must know, that fatty tumours are exceedingly common. There can be little doubt, that these swellings are formed in the same manner, as others, viz. in the first instance, they were coagulable lymph, rendered vascular by the growth of vessels into it, and that their future structure depended on the particular power and action of the vessels. Adipose sarcomatous tumours always have a thin capsule, formed by the simple condensation of the surrounding cellular substance. It adheres very slightly to the swelling, and, chiefly by means of vessels, which pass through this membranous covering in order to enter the tumour. As Mr. Abernethy has accurately described, the vessels are so small, and the connexion so slight, that, in removing the tumour, no dissection is requisite, as the operator may easily put his fingers between the swelling and its capsule, so as to break the little vascular connexions, and entirely detach the disease.

Adipose tumours are never furnished with any large blood-vessels, and the fear of hemorrhage, which frequently deters surgeons from operating, is very unfounded. It is an undoubted fact, that there is no species of tumour, that can be removed with so much celerity, with such apparent dexterity, or with such complete security against future consequences, as those of an adipose nature. However, now and then, when the tumour has been at all in an inflammatory state, the capsule becomes thickened, and intimately adherent to the surface of the swelling, so that the separation of the disease is more difficult, and requires the knife to be more employed. The tumour also sometimes becomes, after inflammation, closely adherent to the contiguous parts. Adipose tumours often acquire an enormous magnitude; Mr. Abernethy relates an example of one, which Mr. Cline removed, which weighed between fourteen and fifteen pounds. In this state, of course, the immense size of a wound, requisite for the removal of the tumour, must be dangerous, and it is a strong argument in favour of having recourse to the operation at an earlier period.

The next species of sarcoma, noticed in Mr. Abernethy's classification, is what this gentleman names *pancreatic*, from the resemblance of its structure to that of the pancreas. This kind of disease, according to Mr. Abernethy, is occasionally formed in the cellular substance; but, more frequently, in the female breast, on that side of the nipple, which is next to the arm. When a pancreatic sarcoma is indolent, and increases slowly, the surrounding parts, and the glands in the axilla, are not affected. But, some of these swellings deviate from their common character, and become of a very irritable nature, occasioning severe and lancinating pain, and producing an inflammatory state of the skin covering them, so that it becomes adherent to their surface. The absorbents leading to the axilla are also irritated, and the glands enlarged. Pancreatic sarcomas do not grow to a very large size; but, when their progress is unrestrained, the pain, attendant on the disease, becomes lancinating, and so severe, as to make the patients feverish, and lose their health and strength. Mr. Abernethy remarks, that, when the axillary glands become affected, one generally swells at first, and is extremely tender and painful; but, afterwards the pain abates, and the part remains indurated. Another then becomes affected, and runs through the same course.

Another species of sarcoma, Mr. Abernethy has characterized by the epithet *mastoid* or *mammary*, from the resemblance which this gentleman conceives its structure bears to that of the mammary gland. This kind of disease, Mr. Abernethy says he has not often seen. In the example, which he met with, the tumour was about as large as an orange, and situated on a woman's thigh. The swelling was removed by an operation; but, the wound afterwards degenerated into a malignant ulcer, attended with consider-

able induration of the surrounding parts, and the woman died of the disease in two months. Mr. Abernethy conceives, that the whole of the morbid part had been cut away, but, that the contiguous parts had a disposition to disease, which was irritated by the operation, and, that if the nature of the case could have been known beforehand, it would have been right to have made a freer removal of the substance surrounding the tumour.

Mr. Abernethy places the mastoid sarcoma, between such sarcomatous swellings as are attended with no malignity, and the following ones, which have this quality in a very destructive degree.

The *tuberculated* sarcoma is composed of a great many small, firm, roundish tumours, of different sizes and colours, connected together by cellular substance. Some of the tubercles are as large as a pea; others equal a horsebean in size; most of them are of a brownish red colour; but some are yellowish. Mr. Abernethy mentions his having seen this species of sarcoma chiefly in the lymphatic glands of the neck. The disease proceeds to ulceration; becomes a painful and incurable sore; and ultimately occasions death.

Another kind of sarcoma, mentioned in Mr. Abernethy's classification of tumours, is distinguished by the epithet *medullary*, from its having the appearance of the medullary matter of the brain. It appears to be an exceedingly malignant disease; communicates to the lymphatic glands a similar distemper; ulcerates and sloughs, and at last proves fatal. It is particularly apt to make its attack on the testis, and it is treated of in another part of this book. (See *Testicle, Diseases of.*)

Mr. Abernethy includes also in his classification *carcinomatous* sarcoma. (See *Cancer.*)

For an account of the plan of operating, in removing sarcomatous tumours, see *Mamma, Removal of.*

TUMOURS, ENCYSTED. These, which are also commonly named wens, consist of a cyst, which is filled with different substances. When the contained matter is fatty, it is termed a *steatoma*; when somewhat like honey, *meliceris*; when like pap, *atheroma*. These are the three species, into which writers usually divide encysted tumours. However, some of these swellings do not conform to either of the above distinctions, as their contents are subject to very great variety indeed, and are occasionally of an earthy, bony, or horny nature. It is said, that some encysted tumours of the latter description have occasionally burst, and assumed the appearance of horns, by the gradual projection of the matter secreted in their cysts. I remember seeing an excrescence of the kind alluded to, removed some years ago from the scrotum of a man in St. Bartholomew's Hospital. Sir James Earle performed the operation, and, if I am not mistaken, the preparation of the disease is in Mr. Abernethy's Museum.

Encysted tumours are generally of a roundish shape, and are more elastic, than fleshy ones. However, the latter circumstance depends very much on the consistence of the contents, and the thickness of the cyst. As far as my observation extends, encysted tumours form more frequently on the head, than any other part; but, they are very frequently met with in all situations under the integuments, and sometimes in deeper places. Encysted tumours are also very often seen on the eyelids.

Some surgeons have tried to cure encysted tumours by pricking them with needles, and squeezing out their contents; or by applying stimulating, and discutient applications to them. This practice, however, is by no means a prudent one; for, it seldom succeeds, and sometimes, in consequence of making the cyst ulcerate, it induces a terrible disease, in which a frightful fungus shoots out from the inside of the cyst, attended with immense pain and irritation, and often proving fatal. In order to confirm this statement, I shall quote the following case, recorded by Mr. Abernethy.

A gentleman, of a stout make, and about forty years of age, had a tumour, supposed to be sarcomatous, which had formed beneath the integuments on the lower edge of the pectoral muscle. It was attended with severe pain occasionally, at which time it rapidly increased in size, and produced a great deal of fever and irritation, which made him look very sickly, and grow very thin, and caused some persons to deem the disease cancerous.

When the tumour had acquired a magnitude of about four inches in length, and three in breadth and depth, he submitted to its removal; the integuments were divided and turned back, and the tumour dissected off the surface, and, in some degree, from under the edge of the pectoral muscle.

When the tumour was examined, it was found to be composed of a steatomatous substance, contained in a thin capsule. The substance resembled that, which I have described as being sometimes found in cells in the testis, or intermixed with the diseased organization of that part. It was firm, and resembled cheese in its yellow colour and unctuous appearance; but, it was not unctuous to the touch.

The wound made in the operation soon

healed, and the patient's health was restored to as good, or seemingly a better state, than before the formation of this disease. He also regained his usual athletic form. But, in less than three months after his recovery, two new tumours formed, one above, and the other below the cicatrix of the wound. The patient did not particularly attend to them till they had attained a size equal to that of a large walnut. To dissect out both these tumours, and make so free a removal of parts as to render it probable, that no new growth would ensue, seemed to be a very formidable operation; and, as the nature of the former tumour was known, and it was supposed, that these were of the same nature, it was agreed to puncture the upper one, to express the contents, and await the event. This was done by a puncture of half an inch in length, made by an abscess lancet. The contents were exactly like those of the original tumour. Vehement erysipelatous or irritative inflammation took place, and sloughing about the diseased part: the inflammation rapidly extended to the opposite side of the thorax, and then down the integuments of the abdomen to the groin. The derangement of the constitution was as violent as the local disease, and, in about a week, the patient died. (*Surgical Observations*, 1804, *p.* 94.)

Similar, alarming, fungous diseases are also apt to arise, whenever the surgeon, in cutting out encysted tumours, leaves any part of the cyst behind.

The most advisable method is to have recourse to the knife, before an encysted tumour has attained any considerable size. When it is large, however, before the operation is resorted to, a portion of the skin must be taken away with the swelling in the manner mentioned in the article *Mamma, Removal of*. The chief piece of dexterity in the operation consists in detaching all the outside of the cyst from its surrounding connexions, without wounding it. Thus, the operator takes the part out in an entire state, and is sure, that none of the cyst remains behind. When the cyst is unskilfully opened, some of the contents escape, it collapses more or less, and the dissection is rendered more tedious and difficult.

Excepting Mr. Abernethy's Classification of Tumours, contained in his *Surgical Observations*, 1804, I am not acquainted with any particularly good work expressly on the subject. However, every system of surgery treats of it, and Mr. John Bell, in his *Principles of Surgery, Vol.* 3, has written a great deal concerning it.

TURU'NDA. (*à terendo*, from its being rolled up.) A tent for keeping open wounds.

TYLO'MA, or TYLO'SIS. (from τυλος, callous.) A callous roughness on the inside of the eyelids. Also, a wart, or a corn.

TYLOTICA. (from τυλοω, to harden.) Medicines, which promote the formation of callus.

TYMPANUM. (τυμπανον, a drum.) The cavity of the drum of the ear. For an account of its diseases, see *Ear*.

TYPHLOSIS. (from τυφλος, blind.) Blindness.

U.

ULA, A gum boil. Also, a cicatrix.

ULCERATION, is the process, by which sores, or ulcers are produced in animal bodies. In this operation, the lymphatics appear to be, at least, as active as the blood-vessels. An ulcer is a chasm formed on the surface of the body by the removal of parts back into the system by the action of the absorbents. At first, it may be difficult to conceive how a part of the body can be removed by itself; but, there is not more difficulty in conceiving this, than how a body can form itself. Both facts are equally well confirmed. When it becomes necessary, that some whole living part should be removed, it is evident, says Mr. Hunter, that nature, in order to effect this object, must not only confer a new activity on the absorbents; but, must throw the part to be absorbed into a state, which yields to this operation. The absorption of whole parts in disease, arises from five causes: pressure; irritation of stimulating substances; weakness; inutility of parts; death of them. (*Hunter on Inflammation, &c. p.* 442—446.)

Ulceration, or, in other terms, absorption, takes place much more readily in the cellular, and adipose substance, than in muscles, tendons, ligaments, nerves, and blood-vessels. Hence, in the progress of pus to the surface of the body, ulceration often takes a circuitous course for the purpose of bringing the matter to the skin. The skin itself, also, being highly organized, considerably retards the bursting of abscesses. It is on this same account, that, when ulceration is spreading,

the edges of the skin hang over the ulcerated surface. (*Hunter, p.* 447.)

New-formed parts, such as cicatrices, callus, and all adventitious new matter, such as tumours, readily admit of being absorbed. The adventitious matter, indeed, is more prone to be absorbed, than that, which is a substitute for the old. Mr. Hunter explained this circumstance on the principle of weakness.

When ulceration takes place, in consequence of the death of an external part, it occurs first on the outer edge, between the dead and living substance.

Abscesses constantly make their way to the surface of the body by ulceration; but, as some textures more readily admit of being absorbed, than others, the matter often follows a circuitous course, before it can arrive at the skin. (*Hunter, p.* 448, 449.)

A tumour, when it makes equal pressure in every direction around, will only make its way in an external course, because what Mr. Hunter termed interstitial absorption, only happens in this direction. (*P.* 449.)

The parts, which are situated between an abscess, or any extraneous substance, and the nearest surface, are those, which are most susceptible of ulceration. This is one of the most curious phenomena, connected with the process under consideration. It shews, that there is a principle in the human body, by which parts are always prone to free themselves of disease. Slight pressure from without will even produce a thickening of parts, and hence, Mr. Hunter remarks, there even appears to be a corresponding backwardness to admit disease. (*P.* 449.) Both these facts, he observes, are shewn in the case of fistula lachrymalis; for, though the matter is nearest the cavity of the nose, still it makes its way externally by means of ulceration, while the Schneiderian membrane even becomes thickened, so as to become a barrier against the progress of the disease inward. (*P.* 451.)

There is one difference, between the advancement of an encysted tumour to the surface of the body, and the progress of an abscess in the same direction, viz. that the former does not excite ulceration of the cyst; but, an interstitial absorption of the sound parts, between the cyst and skin, till the cyst and external skin come into contact, at which period, inflammation takes place, and absorption becomes accelerated into ulceration. In an abscess, the progressive ulceration begins in the cyst, at the same time, that the interstitial absorption in the sound part, covering the matter, is going on. (*P.* 452—457.)

The action of progressive absorption is to remove surfaces contiguous to irritating causes, which Mr. Hunter referred to pressure, irritation, and weakness. In cases of tumours, pressure becomes a cause. The buttocks and hips of persons, who lie long on their backs, often ulcerate. The heels of many patients, with fractures, who lie for a great while in the same position, are apt to ulcerate. In the latter instances, Mr. Hunter conceived, that ulceration is a substitute for mortification, and is, at the same time, a proof of a certain degree of strength; for, if the patient's constitution were very weak, the same parts would mortify. (*P.* 453.) That pressure is a frequent cause of ulceration, is also evinced by the occasional effects of chains on prisoners, and harness on horses.

That irritating substances produce ulceration, needs no illustration.

Progressive absorption may occur either with, or without suppuration. We have instances of the latter in cases of extraneous bodies, which travel about the body, without producing irritation enough to give rise to the secretion of pus. In the progress of aneurisms of the aorta, and of fungous tumours of the dura mater to the surface, the same fact is also illustrated. (*P.* 455.)

Absorption with suppuration, in other words, ulceration, either happens in consequence of suppuration already begun, in which event the pus acts as pressure; or else absorption attacks external surfaces from particular irritations, or weakness, in which case, suppuration must follow. (*P.* 456.)

The production of ulceration requires much greater pressure from without, than from within. The process is always disposed to take place more quickly, when near the surface of the body, and its progress becomes accelerated, in proportion as it arrives near the skin.

The adhesive inflammation precedes the suppurative, and prevents the pus from becoming diffused, as soon as it is secreted, and when the cyst afterwards ulcerates, in order to let the matter approach the skin, the adhesive inflammation still continues to go before the ulcerative process, and thus prevents the matter from insinuating itself into the interstices of the cellular substance. (*P.* 457.)

The pain of ulceration is, in some degree, proportioned to its quickness. When ulceration begins on a surface, or takes place for the purpose of bringing matter to the skin, the pain is always considerable. When ulceration takes place, in order to separate a dead part, as in sloughing, exfoliations, &c. there is seldom any particular pain. (*P.* 459.)

The ulcerating sore always exhibits little cavities, while the edge of the skin is scolloped, and thin, at the same time,

turning a little out, and overhanging, more, or less, the ulcerated surface. The face of the sore appears foul, and the discharge is very thin.

When ulceration stops, the edges of the skin become regular, smooth, a little rounded, or turned in, and of a purple colour, covered with a semi-transparent white. (*Hunter on Inflammation, &c. p.* 460.)

ULCERS. Surgeons usually define an ulcer to be a solution of continuity in any of the soft parts of the body, attended with a secretion of pus, or some kind of discharge.

In the present part of this Dictionary, there will not be occasion to speak of several sorts of sores, which have been treated of in other articles. (See *Cancer*, *Scrophula*, and *Venereal Disease.*)

Some authors divide ulcers into *local* and *constitutional ones.* Other writers make distinctions, which are more particular, and Mr. Home has treated of six kinds of ulcers, viz.

1. Ulcers in parts, which have sufficient strength to carry on the actions, necessary for their recovery.

2. Ulcers in parts, which are too weak for that purpose.

3. Ulcers in parts, whose actions are too violent to form healthy granulations, whether this arises from the state of the parts, or of the constitution.

4. Ulcers in parts, whose actions are too indolent, whether this arises from the state of the parts, or of the constitution.

5. Ulcers in parts, which have acquired some specific action, either from a diseased state of the parts, or of the constitution.

6. Ulcers in parts, which are prevented from healing by a varicose state of the superficial veins of the upper part of the limb.

OF ULCERS IN PARTS, WHICH HAVE SUFFICIENT STRENGTH TO CARRY ON THE ACTIONS NECESSARY FOR THEIR RECOVERY.

Mr. Home remarks, that, in this species of ulcer, the pus is of a white colour, thick consistence, and readily separates from the surface of the sore, and when diluted, and examined in a microscope, is found to be made up of small globules, swimming in a transparent fluid. The granulations are small, florid, and pointed at the top. As soon as they have risen to the level of the surrounding skin, those, next to the old skin, become smooth, and are covered with a thin, semi-transparent film, which afterwards becomes opaque, and forms cuticle.

In the treatment of this kind of ulcer, it is only necessary to keep the surface clean, and prevent the natural processes from being interrupted. Mr. Home observes, that this is in general best done, by the application of dry lint, for the purpose of absorbing and retaining the matter, which serves as a soft covering for the granulations, and by putting over the lint a pledget of any simple ointment, in order to hinder the matter from evaporating, by which means the dressings will not become adherent, and may be easily taken off, as often as requisite.

Although healthy ulcers require no medicated application to be made to them, the dressings must be such as do not disagree with the granulations, or surrounding skin.

With some patients, a roller, applied with moderate tightness, with a view of retaining the dressings, will cause uneasiness in the part, and make the ulcer lose its healthy appearance. Mr. Home states, that he has seen several such cases, in which the proper appearance of the sore returned as soon as the bandage was discontinued.

In some patients, ointment irritates and inflames the neighbouring skin; and certain superficial ulcers will not heal, while kept in a moist state, and unexposed to the air; but heal, when allowed to become dry and covered with a scab.

Mr. Home refers these particularities to constitutional causes, and not disease; for, the ulcers heal as soon as the particular things, which disagree with them, are discontinued. These peculiarities in certain healthy sores may also attend others of a different description, and should always be discriminated from the effects of disease.

Mr. Home very judiciously recommends enquiring of patients, who have previously had sores, what kind of applications they derived most benefit from, and what dressings were found to disagree.

TREATMENT.

1. Applications in the form of vapour, and fomentations, should never be employed, as they render the texture of the granulations looser, and diminish the disposition to form skin

2. With respect to fluid applications, Mr. Home also very properly condemns poultices, as well as fomentations. He speaks of alcohol, as being an application, which promotes the formation of a scab, when this mode of cure is chosen.

3. In regard to ointments, their only use, in cases of healthy ulcers, is to keep the matter from evaporating. The most simple ointments are the best for the purpose; particularly, the one composed of white wax and olive oil.

Mr. Home observes, that the great objections to the common simple ointments

are, that they sometimes disagree with the skin, even when recent, and free from all rancidity. When they have acquired the latter quality, they still more frequently create a greater degree of irritation.

4. With respect to applications in the form of powder, Mr. Home remarks, that, when it is desirable to form a scab on the ulcer, any inert powder may be sprinkled on the sore; but, he prefers dry lint. Nothing should touch the powder, or lint, and, to prevent this circumstance, Mr. Home recommends applying a little bolster on each side of the sore, and over them a roller, which will go from one bolster to the other, in the manner of a bridge.

For healthy ulcers, dry lint is to be regarded as being, upon the whole, the most eligible application. When the sore does not secrete pus enough in twenty-four hours to moisten the lint, the dressings are only to be changed every other day.

When a moderately tight bandage is not forbidden by constitutional peculiarities, it is useful, both in supporting the muscles and skin, which are often in a flabby state from the unexercised state of the limb, and in defending the newly formed parts. (See *Home on Ulcers.*)

ULCERS IN PARTS, WHICH ARE TOO WEAK TO CARRY ON THE ACTIONS NECESSARY FOR THEIR RECOVERY.

This is the second of the classes, into which Mr. Home has divided ulcers in general.

The granulations of these sores are larger, more round on their external surface and of a less compact texture, than those formed on ulcers in healthy parts. Mr. Home has also noticed their semi-transparent appearance. When they have filled up the cavity of an ulcer to a level with the surface of the body, they do not readily form skin, but, rising up in a still higher manner, often lose altogether the power of producing new cutis. When the parts are still weaker, the granulations sometimes continue gradually to fill up the hollow of the ulcer, and then, all on a sudden, are suddenly absorbed, so as to leave the sore, as deep as it was before.

Ulcers may be weak from the first, or become so in the progress of the case. Even granulations of the most healthy kind, if they are not skinned over in a certain time, gradually lose their primitive strength.

Sores on the legs are greatly under the influence of all natural peculiarities of the constitution, and every thing, which affects the health. When the constitution becomes in the least weaker or stronger, the appearance of the granulations becomes changed accordingly, and this effect of constitutional weakness, or strength, on ulcers is greater, in proportion as the sores are further from the source of the circulation.

While the constitution is undergoing any kind of disturbance, the healing of an ulcer is suspended. Mental anxiety is very apt to retard cicatrization.

Such effects, of the constitutional kind, on ulcers are greater in weak, and delicate persons, than in the strong and robust. Change of weather has considerable influence over the healing of sores. Mr. Home mentions, in proof of this fact, that, when there were several hundreds of ulcers in the Naval Hospital at Plymouth, in 1778, every time the weather changed, from a dry to a moist state, the ulcers universally assumed an unhealthy appearance; but, put on a better aspect, when the weather became dry again.

In the treatment of this kind of ulcer, tonics are to be exhibited, particularly, bark and steel, and every thing which disagrees with the constitution, is to be avoided. Wine and cordial medicines are also usually prescribed. Porter, however, is deemed better, than wine, for working people.

Mr. Home observes, that the first object in the local part of the treatment, is to keep the granulations from rising above the edge of the surrounding skin. This gentleman (in my opinion) very judiciously represents the greater propriety of preventing the granulations from ever becoming too high by the employment of proper applications, than following the common plan of destroying the high granulations with escharotics, after they have risen to an improper height. There cannot be the smallest doubt, that if the granulations could always be prevented from rising up too much, the patient would suffer a great deal less pain.

Instead of applying to the surface of the ulcers, now under consideration, lunar caustic, blue vitriol, red precipitate, &c. Mr. Home prefers mixing these escharotics with other substances, so as to render them only strong stimulants, and using them in this latter form. He conceives, that, when the high granulations are destroyed with escharotics, the disposition of the surface underneath to reproduce them is increased, but, that this is not the case, when the luxuriant parts are only stimulated, so as to become absorbed.

The same gentleman seems to think, that, when animal substances grow with great rapidity, they are, like vegetable ones, weaker, than when produced in a slower manner. Hence, Mr. Home is of opinion, that the growth of granulations

ought to be checked in the early stage of their formation, by some resistance, which they are just able to overcome, under which circumstances, they derive strength from the limited increase of action, which they are obliged to undergo.

On the same principle, according to Mr. Home, the pressure of tight bandages is advantageous, and ulcers, which heal, while the patient is walking about, are not so apt to break out again, when healed, while the parts are in a state of perfect rest.

In the treatment of these ulcers, when the granulations have come to a proper height, and do not form a thin, semi-transparent pellicle upon their surface, they are to be considered as weak parts, and treated accordingly. Mr. Home thinks, that, in this circumstance, the best plan, when no particularity of constitution forbids, is pressure, made with a thin piece of lead over the dressings, and supported with a tight bandage.

OF APPLICATIONS TO ULCERS ATTENDED WITH WEAKNESS.

Although, strictly, we have no topical applications, which can directly communicate strength to granulations, there are certainly some, which prevent the granulations from exhausting themselves by luxuriant growth, and stimulate them to draw more blood from the arteries; which effects, as Mr. Home remarks, render such granulations stronger.

1. This gentleman very properly condemns, as applications to weak ulcers, all relaxing fomentations commonly employed; and recommends, instead of them, the use of sprits of wine and the decoction of poppies, in equal proportions, not, however, to be applied hot.

2. With regard to moist applications, the same gentleman expresses his disapprobation of poultices, and mentions a weak solution of the argentum nitratum, as the most eligible application in an aqueous form.

3. On the subject of powdered substances, as applications to weak ulcers, Mr. Home says, he has often tried bark, and the lapis calaminaris, without perceiving, that the former had any power of strengthening granulations, or the latter any virtue in disposing them to form new skin; properties commonly imputed to these applications.

Mr. Home entertains no better opinion of plaster of Paris, or powdered chalk, employed with a view of promoting the formation of skin. Powdered carbon, he speaks of, as being more adapted to irritable, than weak ulcers. He praises powdered rhubarb, as particularly applicable to the latter kind of ulcer, because, it represses the luxuriant growth of the granulations, renders them small and compact, and disposes them to form skin. When, however, the granulations have risen above the level of the skin, it is not powerful enough to reduce them. When the rhubarb is too stimulating, it is to be mixed with a fourth part of crude opium in powder.

A piece of lint, a little less, than the sore, is always to be put over the powder, and covered with a pledget of simple ointment.

4. Ointments, according to Mr. Home, are particularly apt to disagree with weak ulcers. When other applications fail, however, greasy ones may be tried, and the above gentleman gives a preference to the ung. hydrarg. nitrat. mixed with hog's lard, in the proportion of one to five, or else to common cerate, blended with a small quantity of the hydrarg. nitrat. ruber.

OF ULCERS IN PARTS, WHOSE ACTIONS ARE TOO VIOLENT TO FORM HEALTHY GRANULATIONS; EITHER FROM THE STATE OF THE PARTS, OR THE CONSTITUTION.

There are three states of the constitution influencing the nature of ulcers: an irritable state, in which all the actions of the animal economy are more rapid, than in health; an indolent state, in which they are unusually languid; and, lastly, a diseased state, by which they are affected.

An irritable, and an indolent ulcer cannot in general be distinguished from each other by mere appearances, though they may be so in a few instances. Mr. Home informs us, that the disposition of an ulcer, like the disposition of a constitution, can only be accurately ascertained by determining the actions, which arise from the different impressions made upon it.

The same gentleman notices, that the following appearances at once shew the ulcer to be of an irritable kind. The margin of the surrounding skin being jagged, and terminating in an edge, which is sharp and undermined. The bottom of the ulcers being made up of concavities of different sizes. There being no distinct appearance of granulations, but, a whitish spongy substance, covered with a thin, ichorous discharge. Every thing, that touches the surface, gives pain, and very commonly makes it bleed. The discharge is altered from common pus to a thin fluid, in proportion to the degree of irritability communicated to the sore by constitutional causes.

The pain of an irritable sore in general gradually becomes less. When it is not constant, but comes on in paroxysms chiefly in the evening, or night-time, with

great violence, convulsive motions of the limb are apt to occur, and extend to various other parts. Mr. Home refers this symptom to irritation communicated along the course of the nerves, and producing an action in them, attended with a violent contraction of the muscles, which they supply.

When the above-mentioned signs of an irritable ulcer are not present, we must form a judgment of the nature of the sore from listening to the history of the case, the effects of various applications, &c. When this kind of information cannot be obtained, Mr. Home recommends the treatment to begin on the supposition of the ulcer being of an irritable nature.

When an ulcer occurs just over the malleolus externus, it is generally of an irritable kind, in consequence of the nature of the part, on which it is situated, quite independently of any constitutional, or local disposition to irritability. Mr. Home conceives, that the periosteum, which here lies immediately under the skin, becomes the seat of the ulcer, is the cause of its being very difficult to heal, and gives it the irritable appearance. The fact, that sores, situated on the ligament of the patella, and over the periosteum of the anterior surface of the tibia, assume a similar appearance, and are equally difficult to heal, made the above gentleman more confirmed in his sentiment.

In treating ulcers in general, the surgeon will find it exceedingly advantageous to be acquainted with the effects of a great many different external applications; for, a very few cases will continue to heal more, than for a certain time, under the same treatment. The necessity of changing the applications, after they have been continued for a certain time, is strikingly illustrated by the fact, that leaving off a powerful application, and employing one, which at first would have had no effect, often does a great deal of service. When the change is made to a medicine of powers, equal to those of the previous one, the benefit will be more lasting, than in the preceding circumstance.

Mr. Home compares the principle of this occurrence, with that, by which change of air, even of a very salubrious air, for one that is less so, often produces an infinite improvement of the health.

OF APPLICATIONS TO IRRITABLE ULCERS.

1. Mr. Home recommends applications, in the form of vapour, as being particularly useful, by their quality of allaying irritation, and soothing pain.

The steam of warm water is productive of benefit in this way, though seldom used by itself. Its good effects are increased, when it is mixed with spirits.

Mr. Home speaks also in favour of the benefit derived from fomentations containing opium; such as, the tincture of opium sprinkled on flannel, wrung out of hot water; or the application of flannels, wet with a warm solution of the extract of opium, or with a decoction of poppy heads. A decoction of chamomile flowers, the tops of wormwood, or hemlock leaves, may also be employed for the same purpose.

Mr. Home points out particular irritable ulcers, however, which are rendered more painful by warm applications, and he states, that, the sores, alluded to, are generally attended with a mottled, purple discolouration of the limb, for some way from them, and a coldness of the lower part of the leg, and that they are often disposed to mortify, which event is promoted by warmth.

2. As for moist applications, the poultice made of linseed meal is the most simple and most easily made, and, as it does not necessarily require any addition of oil, is to be preferred, when this disagrees with the sore.

Mr. Home does not say much in favour of the use of the extract of lead in poultices; for, though he allows, that it often answers very well, he adds, that it also frequently disagrees with the ulcer, and, if long used, is apt to bring on the lead-colic.

A decoction of poppy-heads is said to be a very good liquor for making poultices.

The carrot-poultice is also found to agree with a great many irritable sores.

The great objection to poultices, in these cases, being the weight of such applications, the limb should always, if possible, rest upon the poultice, and not the poultice upon the limb. When the weight cannot be avoided, and is hurtful, a lighter application should be chosen.

If poultices be employed, their use is to be continued, as long as the granulations are small, and the ulcer is rapidly diminishing in size, and this even till the cicatrization is complete. When the granulations become large, and loose in their texture, poultices should be left off.

When the weight of poultices prohibits their use, Mr. Home advises the trial of lint, dipped in one of the following lotions, and covered with a pledget of some simple ointment: a solution of the extract of opium; a decoction of poppies; the tincture of opium; a decoction of cicuta; the aqua lithargyri acetati composita; or a diluted solution of the argentum nitratum.

3. Powdered applications are generally too stimulating for irritable ulcers. Carbon has been found useful; so has powdered extract of opium, mixed with an equal quantity of carbon, or linseed flour. However, opium occasionally affects the

constitution, in consequence of absorption, and it has been known to excite violent inflammation, ending in mortification.

4. Ointments are not often proper applications for irritable ulcers; as they are always, more or less, rancid, and generally disagree with the skin of persons, most subject to such diseases.

Mr. Home mentions cream, as being a very useful application, particularly in cases, in which warmth is found to do harm. The same gentleman recommends, as a substitute for it, an ointment, composed of hog's lard, purified by being repeatedly washed in spring water, and then mixed with a small quantity of white wax, and rose water.

The observations, made respecting solutions of lead, apply to the unguentum cerussæ acetatæ.

5. The pressure of bandages is generally hurtful to irritable sores, though a slight degree of it proves serviceable to certain ulcers, which are somewhat less irritable, and arise from weakness.

OF ULCERS IN PARTS, WHOSE ACTIONS ARE TOO INDOLENT TO FORM HEALTHY GRANULATIONS, WHETHER THIS INDOLENCE ARISES FROM THE STATE OF THE PARTS, OR OF THE CONSTITUTION.

Such is the next division of ulcers adopted by Mr. Home in his treatise on the subject. The indolent ulcer forms in its appearance a complete contrast to the irritable one. The edges of the surrounding skin are thick, prominent, smooth, and rounded. The surface of the granulations is smooth and glossy. The pus, instead of being of a perfect kind, is thin and watery, being composed of a mixture of pus and coagulating lymph. The lymph consists of flakes, which cannot be easily separated from the surface of the sore. The bottom of the ulcer forms quite a level, or nearly so, and, as Mr. Home very accurately remarks, the general aspect conveys an idea, that, a portion of the skin and parts underneath has been for some time removed, without the exposed surface having begun any new action to fill up the cavity.

When, however, the indolence of the ulcer is not so strongly marked, the sore does not correspond to the preceding description, but resembles in appearance the ulcer, which possesses an inferior degree of irritability, and can only be discriminated from it by receiving no benefit from soothing applications.

The odd circumstance of some indolent sores having the appearance of irritable ones is, in some degree, explained by ulcers always being influenced by changes in the constitution, and accidental circumstances affecting the parts.

Most of the ulcers, which are to be seen in the London hospitals, are of the indolent kind. An indolent disposition in the ulcer may proceed altogether from the long existence of the disease, and, hence, Mr. Home very justly observes, it is immaterial, whether at first it was healthy, weak, or irritable, for, if not cured within a certain time, it becomes indolent, with the exception of a few of the irritable kind, which never change their nature.

Indolent sores do form granulations; but, these, every now and then, are all on a sudden absorbed, and, in the course of four and twenty hours, the sore becomes as much increased in size, as it had been diminished in as many days, or weeks. This absorption of the granulations arises principally from their not being of a healthy kind; but, the event is promoted by changes in the weather, anxiety, fatigue, &c.

The object in the treatment of indolent ulcers is not simply to produce a cure, but to render such cure as permanent as possible. This can only be accomplished by altering the disposition of the granulations, and rendering them strong enough to stand their ground after the ulcer is filled up.

When an ulcer, which has existed six months, is dressed with poultices for a week, the granulations, at the end of this time, will have in part filled up the hollow of the sore, but, they will be found, large, loose, and glossy. Should the poultice be now discontinued, and some proper stimulating application used for another week, the granulations will be found, at the expiration of this time, to have become smaller, more compact, redder, and free from the glossy appearance. The ulcer, when healed by the latter application, will not be so likely to break out again, as when healed with large, loose, flabby, glossy granulations.

Mr. Home states, that the number of indolent sores, which heal under the use of stimulating applications, and do not break out again, compared with similar cases, treated with mild dressings, are as four to one.

APPLICATIONS TO INDOLENT ULCERS.

1. Medicines in the form of vapour, cannot heal indolent sores, so that the cure shall be lasting. It is only when these ulcers assume a foul appearance, and are in a temporary state of irritation, that such applications can be advantageously employed.

In general, patients on their first admission into hospitals with sore legs, have their ulcers in a temporary state of irritation from neglect, exercise, excesses, &c. Hence, it is generally found advantageous,

for the first few days, or even a week, to have recourse to poultices and fomentations.

I believe, that any common fomentation, whether of chamomile, poppy-heads, or mere warm water, answers equally well. The time for using it, is while a fresh poultice is preparing, and this latter application should be changed twice a day.

2. Moist applications, such as poultices, are to be employed, when fomentations are proper, and they may be made of bread, oatmeal, or linseed.

Mr. Home describes a species of indolent ulcers, which occur in patients of debilitated constitutions, which put on a sphacelated appearance, without any apparent cause, even after they have made some progress towards a cure, and in this way spread to a very large size. Some of these ulcers, if judged of from their appearances, would be ranked as irritable ones; but, as soothing applications do not agree with them, they are not to be classed with the latter kind of sores. They are said to occur particularly in seamen, and soldiers, who have been long at sea, and have been termed *scorbutic* ulcers. Mr. Home represents them, however, as not being necessarily connected with the scurvy, and being often met with in patients, who have not been on the sea. This gentleman states, that these ulcers are not of necessity joined with any specific disease; but are common to all kinds of patients, whose constitutions have been impaired, either by salt provisions, warm climates, or drinking.

From some trials, first made by Dr. Harness, and afterwards by Mr. Home, it appears, that these particular ulcers, when in a sphacelated state, are benefited by employing the gastric juice of ruminating animals, as an external application. It makes the sloughs fall off, and the sore assume a better appearance. Some pain follows on its being first applied, and it is to be regarded as a stimulating application.

Mr. Home mentions, that in the West Indies, such ulcers are advantageously dressed with the fresh root of the cassada, grated into a pulp. Lime-juice has also been found a useful application, and solutions of vitriol and alum have been recommended.

When indolent ulcers are not attended with certain peculiarities, a solution of the argentum nitratum is one of the best of the watery applications. It stimulates the granulations, and makes them put on a more healthy appearance, and its strength may be increased according to circumstances. An ulcer, which at first cannot bear this solution above a certain strength, without pain, and without the granulations being absorbed, becomes able, after the application has been used, about ten days, or a fortnight, to bear it twice as strong, without such effects being produced: a proof of the granulations having acquired strength.

The tincture of myrrh is often employed as an application to indolent ulcers. Hunezowsky has praised a decoction of the walnut-tree leaves, and soft covering of the walnut, for the same purpose. (*Acta Acad. Med. Chir. Vindob. Tom.* 1. 1788.) Mr. Home gives his testimony in favour of both the latter dressings.

The diluted vitriolic acid, and the expressed juice of the pod of different species of pepper in a recent state, are mentioned by Mr. Home as having been used as applications to indolent ulcers: the latter one in the West Indies.

This gentleman recommends also a scruple of nitrous acid, mixed with eight ounces of water, as a very useful medicine for external use. The strength must be increased or diminished, according to circumstances. Mr. Home has found, that this application promotes, in a very uncommon manner, the progress of the cure.

The first application of diluted nitrous acid gives a good deal of pain, which lasts about half an hour, and then goes off.

When an indolent ulcer heals with the diluted nitrous acid, the process of skinning is accomplished with more rapidity, than when other applications are employed; and the new skin is said to be more completely formed. The acid coagulates the pus as soon as it is secreted.

Mr. Home says, that several patients, who had ulcers dressed with the diluted nitrous acid, were allowed to walk about, without finding the progress of the cure retarded, although no bandage to support the limb was made use of. This gentleman, informs us, also, that in ulcers of the leg, attended with an exposure of a piece of bone, which is neither acted upon by the absorbents, nor deprived of life, so as to form an exfoliation, so that the ulcer is kept from healing, the application of diluted nitrous acid to the bone, removes the earthy part, and excites the absorbents to act upon the remaining animal portion.

3. The only application, in the form of powder, adapted to indolent ulcers, is, according to Mr. Home, the hydrargyrus nitratus ruber. It is only to be occasionally used for ulcers of the most indolent kind.

4. Ointments are represented as being particularly proper applications for the sores under consideration.

The idea of the air having bad effects on ulcers exposed to it, is now disbelieved. That air has no irritating property of this kind, is proved by the fact, that, when the

abdomen of an animal is filled with it, no inflammation is excited. When the cellular membrane is loaded with it, in cases of emphysema, the parts do not afterwards inflame. Nor, do ulcers in the throat, as Mr. Home justly remarks, heal less favourably than others, although they are of necessity always exposed to the air.

Whatever ill effects arise, may probably be explained by the consequences of evaporation, which converts the soft pus into a scab.' The granulations are, in all probability, most favourably circumstanced, when they are covered with their own matter, which should only be now and then removed, in order that such applications may be made, as will stimulate them to secrete a more perfect pus. From what has been just stated, it must be obvious, that indolent ulcers should not be frequently dressed, and, that if they are so, and the dressings are stimulating, the practice will do harm. Changing the dressings once in twenty-four hours is deemed quite sufficient, unless the quantity of matter is very great, which very seldom happens in these cases.

One part of the unguentum hydrargyri nitrati mixed with three of hog's lard, is one of the best applications. Its strength, however, must be increased after being used, for some time, as a dressing for the same ulcer.

The unguentum hydrargyri nitrati has the effect of quickly removing the thickening of the edges of indolent ulcers, and the surrounding dark red colour of the skin. It seems also to have particularly great power in making the granulations become small and healthy, and, of course, the ulcer is less likely to break out again.

With some ulcers, however, this ointment is found to disagree.

The unguentum resinæ flavæ, and the unguentum elemi, mixed with the balsam of turpentine, or that of copaiba, are other common applications to indolent sores. Mr. Home states, that the resins and turpentines are not so powerful, as the acids and metallic salts, in giving the granulations a healthy appearance, and a disposition to resist being absorbed.

Cases, attended with a degree of indolent thickening, are such as are most likely to be improved, by camphorated ointments.

In numerous cases, the applications, whatever they are, soon lose their effect, and others should then be substituted for them. The past and present states of the sore are always to be considered. Although, the ulcer may be in its nature indolent, it is liable to temporary changes, from constitutional causes, and hence, a temporary alteration in the treatment becomes proper.

5. Bandages are undoubtedly of the most essential service in healing many kinds of ulcers: but, their efficacy is so great in curing numerous indolent sores, that they are considered by some as the principal means of cure.

Among the advocates for the employment of the roller, Mr. Whately is one of the most zealous. The following extracts will convey to the reader a tolerably good idea of this gentleman's opinions.

" The efficacy of *pressure* in counteracting the effects of the dependant posture, was indeed known to the father of English surgery; and the use of the laced stocking was recommended by him for this purpose; nor can there be any doubt, that, the good effects of it in his hands, were very manifest. His ideas, however, seem not to have been much regarded by succeeding surgeons. We find but little said by the writers on surgery, on the effects of pressure in the cure of ulcers on the lower extremities, previous to the appearance of Dr. Underwood's treatise. Yet I am aware, that there always have been practitioners, who were acquainted with the importance of this mode of treatment, and have adopted it in their practice. I had, myself, an opportunity of seeing the extraordinary success attending it, during my apprenticeship in the country. It is matter of fact, however, that the practice is very far from being general. Even in one of the latest publications on the subject, and this too by a surgeon of the first eminence, the effect of pressure is not much relied upon for the cure of these complaints. It is, indeed, there stated, in several passages, not only that no benefit is derived from compression in several species of these ulcers, but that many ulcers are rendered worse, more painful, and more unhealthy in their appearance by its use (as observed in Mr. Home's Remarks on Ulcers of the Legs.) That there are certain conditions of an ulcer, which will not bear compression, I have allowed, and have endeavoured to point out the proper treatment, to bring on a fit state for the application of that pressure: but that an experienced surgeon should pass over so slightly this most essential part of the cure, and even speak of it as *frequently* injurious, is a circumstance hardly to be attributed to any other cause than that of a careless and ineffectual application of the bandages. For my own part, having now been for twenty years constantly in the habit of treating a very large number of these cases, I can speak so confidently of the good effects of pressure, properly applied, that I can venture to affirm, that he who doubts its efficacy, has never given it a fair trial.

" In the cases which are added to this essay, (says Mr. Whately) very little variety of dressing was used; the cure was

almost always trusted principally to the pressure made on the limb, under the exceptions particularly specified in the work. My success has been so uniform, that I cannot but be anxious to see this practice become established and generally followed. Nothing but a conviction, that in promoting this end, I am really doing an important service to my fellow-creatures, could have induced me to appear before the tribunal of the public, conscious as I am of my incompetency as a writer. But may I not hope, that the plain tale of a practical man will be heard, though not told with the graces of elegant language?

"In whatever manner this attempt be received, I cannot doubt but that the practice here recommended must, in the end, prevail, notwithstanding it has this great obstacle to contend with, that surgeons must condescend, for the most part, to apply the bandages with their own hands. The clumsy and ineffectual manner, in which this business is too frequently done, can never be expected to produce the desired effect. I am certain, that if the necessary pains be taken, according to the directions here laid down, such effects will uniformly follow, as must convince the unprejudiced mind, that to have recourse to the operation of tying varicose veins, and the application of a great variety of remedies, can be *very rarely*, most probably *never* necessary. I can safely declare, that all such cases, as are described by Mr. Home to be cured by this operation, have readily yielded, under the proper management of pressure alone.

"Since these papers were preparing for the press, I have seen with pleasure Mr. Baynton's new method of treating these complaints. Every thing that is there said on the efficacy of his method, may be considered as confirming the doctrine laid down in the following pages. His mode, however, of making the pressure with adhesive plaster, appears to me inconvenient, and on several accounts objectionable. I have no doubt but that the proper application of compresses and flannel rollers, would, in every case recorded by him, have produced similar good effects. The instances of success by this method, after the supposed failure by the roller, I can only attribute to this, that the pressure made with the plasters was applied by his own hands, whereas that with the roller, was probably, as is usual, so made, that the effect intended by it could not possibly have been obtained. No surgeon, who will not be at the trouble of applying them himself, can be a judge of what may be effected by the proper management of the roller and compresses."

The following is the calamine cerate, which Mr. Whately has usually employed:

℞. Axung. Porcin. depur. lib. iij.
Empl. Lithargyr. lib. iss.
Lap. Calam. præp. ap. lib. j. M.

"To this formula (says Mr. Whately,) I shall add another for making a cerate, which nearly resembles the unguentum tripharmacum of the old Dispensatory, but being less oily, it makes a much more adhesive plaster. It should be spread on rag, or silk, as an external covering to the dressing on lint, where a tow plaster cannot be conveniently used; as in wounds of the face or hands, a bubo, or any other sore, where an external plaster cannot be readily retained in its situation by a bandage. This plaster is likewise so mild, that it never irritates the skin. I have found it also a very useful plaster in fractures. The following is the formula:

℞. Empl. Litharg. lib. j.
Axung. Porcin. depur. unc. vj.
Aceti unc. iv. M."

With respect to the proper method of applying the roller and compresses, Mr. Whately offers the following remarks:

"I have said, that the flannel rollers should be four inches wide, to allow for shrinking in washing; by which I would have it understood, that when they are made of that width, they are a little too wide: especially for those whose legs are small. The best width for a flannel roller, designed for those who have slender legs, is three inches; but for those, whose legs are of a large size, they should be always three inches and a half in width. They must therefore be at first torn a little wider, that they may be of their proper width when repeatedly washed. It will likewise be found, that rollers made of fine, soft, and open flannel, will answer much better, than those made of coarse or hard flannel.

"For those who have full sized legs, the length of six yards is but just sufficient to answer all the purposes intended by a roller; but in those who have very small legs, five yards is a sufficient length. Care should be taken that the rollers be washed in very hot water, and they should be hung up to dry immediately on being washed. If these precautions be not attended to, repeated washing them will, in some kinds of flannel, make them as narrow as tape, by which they will be rendered almost useless. They should be often washed, as they are much softer, and of course sit easier, when quite clean, than when they are soiled.

"In applying a roller, (says this gentleman,) the first circle should be made *round* the *lowest* part of the ankles as near as possible to the heel; the second should be formed from thence round the foot; the third should be passed again round the

foot quite to the toes. The roller should then be passed from the foot round the ankle and instep a second time to make the fourth circle. In doing this, it should be brought nearer (but not over) the point of the heel than it was at the *first time* of going round this part. The fifth circle should pass over the ankles again, and not more than half an inch higher up the leg than the fourth circle. The sixth, seventh, eighth, and ninth circles should ascend spirally along the small of the leg, at the *exact distance* of three-fourths of an inch from each other. Having proceeded thus far up the leg, we may begin to increase the distances of the circles from each other; they may succeed each other upward to the knee at the distance of from one to two inches, according to the size and shape of the leg. At that part where the calf of the leg commences, it is generally necessary to let the upper edge of the roller be once, twice, or thrice, turned downwards for about half the circumference of the leg, in order to make the roller lay smooth between the middle of the calf, and the small of the leg. When the roller has been thus applied as far as the knee, there will be a portion of it to spare, of perhaps a yard in length; this remainder should be brought down by spiral windings, at greater distances from each other than those which were made on the ascent of the roller. The windings should in general be completed in the small of the leg, where the roller should be pinned.

"In *many* cases, it is necessary to apply the roller *over* the *heel*. It should be brought as low as possible round the ankle; as in the former description. From thence, the second circle of the roller should pass from the instep over one side of the heel, and be brought over the other side of the heel to the instep again. The third circle should be passed round the ankle a second time, but still nearer to the heel than the first circle was. The roller should after this be brought back to the foot, and passed round it to make the fourth circle. A fifth circle should be again made (though it is not in all cases absolutely necessary) round the foot, to the toes. To make the sixth circle, the roller should be brought back, and passed round the ankle again. The seventh, eighth, ninth, tenth, and eleventh circles should ascend spirally at the *exact distance* of three-fourths of an inch from each other; these distances commencing at the sixth circle. The roller should then be carried to the knee, and be brought down again to the small of the leg, as described in the former instruction.

"In applying the compresses, it is necessary in every instance to put them on one by one, and not all in a mass, though they be of a proper size and number. They should be crossed in different directions; the largest of them should in no case be longer than just to meet on the opposite side of the leg, to which they are applied. I have in many instances seen the compresses applied by the patients of such a length as to go round the leg like a roller, and be fastened together with pins. This method generally wrinkles and blisters the skin, and by no means answers the purpose of making a compression on the part where it is most wanted. I never suffer a pin to be used in the compresses. If the same compresses in any case be applied two days together, they should always be turned on the contrary side at each re-application, in order to prevent wrinkles on the skin."

Mr. Whately notices two objections made by Mr. Baynton to rollers. "The first is, that it is difficult to retain the roller on the parts to which it is applied; the second is, that it gives pain to the patient." Mr. Whately's experience, however, warrants him in saying, that a flannel roller will, in almost every instance, keep the exact position it was first placed in, for a much longer time than is necessary. "I have seen these rollers (says Mr. Whately) many hundred times keep their situations without any variation whatever for two days; and that too without the least restraint upon exercise. This has happened in those cases, where from the distance of the patient, or from the circumstance of his being nearly cured, I have wished to dress the leg only every forty-eight hours. I must go a step further, and observe, that I have seen repeated instances in which these rollers have remained in their situation for three or four days, and even nearly for a week without being applied afresh. In short, it is one of the best properties of a flannel roller, that it is easily retained in its situation, when well applied. In *every* instance, in which it is necessary to use one, I could pledge myself to apply it in such a manner, as should prevent its altering its position for two days. The method I should use, I have already described; in addition to which, nothing more would be necessary, even in those cases where the shape of the leg is peculiarly unfavourable to the retention of a bandage, than the insertion of a few pins.

"In answer to the second objection, I observe, that I have invariably found, that when a flannel roller has been applied in the manner here described, and has not been drawn unnecessarily tight, it gives no pain. It sits nearly as easy as a common stocking, and allows a very free motion and exercise of the limb.

It has been stated in this work, that the application of the compresses makes the necessary degree of pressure on the ulcer, and thereby prevents the necessity of drawing the roller so tight over the other parts of the leg, as would have been necessary were the compresses not used.

"There is another circumstance which Mr. Baynton considers as giving his method a great advantage over the roller, which is, that by means of the plaster, the edges of the sore may be made to approximate in such a manner, that the cicatrix, or new-formed skin, will be less after a cure performed by this method than by any other. In almost all these cases, before the cure is attempted, the leg is more or less enlarged by swelling; and as this swelling is entirely removed by compression, it readily allows the skin to approximate on the healing of an ulcer. Added to this, there is a process in nature always going on in healing an ulcer or wound in any part of the body, (whether there be a loss of substance or not,) by which a cicatrix is always considerably less than the previous size of the sore. This effect occurs in all cases, whether the patient be cured by the horizontal position, a roller, or by strips of adhesive plaster. The size of this cicatrix will likewise vary in different cases where the ulcers have been of the same size, by whichever of these three methods they be cured. It will be larger in those ulcers which are accompanied with strong adhesions of the adjoining parts, than in those where such adhesions have not been produced; and this effect will take place to the greatest degree where the ulcers are situated over the tibia, and by long continuance have produced immoveable adhesions of the cellular substance to the adjoining periosteum. The adhesive plaster, when applied as a bandage, will without doubt leave as small a cicatrix as any other method of cure; but, for the reasons already assigned, I do not believe that the cicatrix will in any case be *smaller* than that produced by a roller. In every case cured by the latter method, I have found the cicatrix very small, when compared with the previous size of the ulcer."—(See *Practical Observations on the Cure of Wounds and Ulcers on the Legs, without Rest; by Thomas Whately*, 1799.)

6. We shall next introduce an account of Mr. Baynton's plan of curing old ulcers of the leg, by means of adhesive plaster. Were I to say, that any particular method of dressing such sores is entitled to superior praise, I should certainly decide in favour of this gentleman's practice. I have seen it most successful myself, and I hear it highly spoken of by numerous professional friends, in whose unprejudiced judgment I place much reliance.

Mr. Baynton acquaints us, that the means proposed by him will, in most instances, be found sufficient to accomplish cures in the worst cases, without pain or confinement. After having been repeatedly disappointed in the cure of old ulcers, Mr. Baynton determined on *bringing the edges of old ulcers nearer together by means of slips of adhesive plasters.* To this he was chiefly led, from having frequently observed, that the probability of an ulcer continuing sound, depended much on the size of the cicatrix, which remained after the cure appeared to be accomplished; and from well knowing, that the true skin was a much more substantial support and defence, as well as a better covering, than the frail one, which is obtained by the assistance of art. But, when he had recourse to the adhesive plaster, with a view to lessen the probability of those ulcers breaking out again, he little expected, that an application so simple would prove the easiest, most efficacious, and most agreeable means of treating ulcers.

Although the first cases, in which Mr. Baynton tried this practice, were of an unfavourable nature, yet he had soon the satisfaction to perceive that it occasioned very little pain, and materially accelerated the cure, while the size of the cicatrices were much less than they would have been, had the cures been obtained by any of the common methods.

At first, however, the success was not quite perfect; as, in many instances, he was not able to remove the slips of plaster, without removing some portion of the adjacent skin, which, by occasioning a new wound, proved a disagreeable circumstance, in a part so disposed to inflame and ulcerate, as in the vicinity of an old sore. He therefore endeavoured to obviate that inconvenience by keeping the plasters and bandages well moistened with spring-water, for some time, before they were removed from the limb. He had soon the satisfaction to observe, that the inconvenience was not only prevented, but that every succeeding case justified the confidence he now began to place in the remedy. He also discovered, that moistening the bandages was attended with advantages which he did not expect: while the parts were wet and cool, the patients were much more comfortable in their sensations, and the surrounding inflammation was sooner removed, than he had before observed it to be.

By the mode of treatment here recommended, Mr. Baynton found, that the discharge was lessened, the offensive

smell removed, and the pain abated in a very short time. But, besides these advantages, he also found, that the callous edges were in a few days level with the surface of the sore; that the growth of fungus was prevented, and the necessity of applying painful escharotics much lessened, if not entirely done away. Mr. Baynton gives the following description of his method.

"The parts should be first cleared of the hair, sometimes found in considerable quantities upon the legs, by means of a razor, that none of the discharges, by being retained, may become acrid, and inflame the skin, and that the dressings may be removed with ease at each time of their renewal, which, in some cases, where the discharges are very profuse, and the ulcers very irritable, may, perhaps, be necessary twice in the twenty-four hours, but which I have, in every instance, been only under the necessity of performing once in that space of time.

"The plaster should be prepared by slowly melting, in an iron ladle, a sufficient quantity of litharge plaster, or diachylon, which if too brittle, when cold, to adhere, may be rendered adhesive by melting half a drachm of resin with every ounce of the plaster: when melted, it should be stirred till it begins to cool, and then spread thinly upon slips of smooth porous calico, of a convenient length and breadth, by sweeping it quickly from the end, held by the left hand of the person who spreads it, to the other, held firmly by another person, with the common elastic spatula used by apothecaries; the uneven edges must be taken off, and the pieces cut into slips, about two inches in breadth, and of a length that will, after being passed round the limb, leave an end of about four or five inches. The middle of the piece so prepared, is to be applied to the sound part of the limb, opposite to the inferior part of the ulcer, so that the lower edge of the plaster may be placed about an inch below the lower edge of the sore, and the ends drawn over the ulcer with as much gradual extension as the patient can well bear; other slips are to be secured in the same way, each above and in contact with the other, until the whole surface of the sore and the limb are completely covered, at least one inch below and two or three above the diseased part.

"The whole of the leg should then be equally defended with pieces of soft calico, three or four times doubled, and a bandage of the same, about three inches in breadth, and four or five yards in length, or rather, as much as will be sufficient to support the limb from the toes to the knee, should be applied as smoothly as can be possibly performed by the surgeon, and with as much firmness as can be borne by the patient, being first passed round the leg, at the ankle-joint, then as many times round the foot as will cover and support every part of it, except the toes, and afterwards up the limb till it reaches the knee, observing that each turn of the bandage should have its lower edge so placed as to be about an inch above the lower edge of the fold next below.

"If the parts be much inflamed, or the discharge very profuse, they should be well moistened, and kept cool with cold spring-water poured upon them as often as the heat may indicate to be necessary, or, perhaps, at least, once every hour. The patient may take what exercise he pleases, and it will be always found, that an alleviation of his pain and the promotion of his cure will follow as its consequence, though, under other modes of treating the disease, it aggravates the pain, and prevents the cure.

"These means, when it can be made convenient, should be applied soon after rising in the morning, as the legs of persons affected with this disease are then found most free from tumefaction, and the advantages will be greater than when they are applied to limbs in a swollen state. But at whatever time the applications be made, or in whatever condition the parts be found, I believe it will always happen, that cures may be obtained by these means alone, except in one species of the disease, which seldom occurs, but that will hereafter be described. The first application will sometimes occasion pain, which, however, subsides in a short time, and is felt less sensibly at every succeeding dressing. The force, with which the ends are drawn over the limb, must then be gradually increased, and when the parts are restored to their natural state of ease and sensibility, which will soon happen, as much may be applied as the calico will bear, or the surgeon can exert; especially if the limb be in that enlarged and incompressible state, which has been denominated the scorbutic, or if the edges of the wound be widely separated from each other."

Mr. Baynton afterwards takes notice of the breaking of the skin, near the ulcers; a circumstance, which sometimes proved troublesome, and arose partly from the mechanical effect of the adhesive plasters, and partly from the irritating quality of the plaster. Mr. Baynton, however, only considers such sores of serious consequence, when they are situated over the tendon of Achilles, in which situation they are sometimes several weeks in getting well. This gentle-

man recommends, with a view of preventing these ulcers, a small shred of soft leather to be put under the adhesive plaster.

Mr. Baynton next adds, "that cures will be generally obtained without difficulty, by the mere application of the slips and bandage; but, when the parts are much inflamed, and the secretions great, or the season hot, the frequent application of cold water will be found a valuable auxiliary, and may be always safely had recourse to, where the heat of the part is greater, than is natural, and the body free from perspiration." (See *A Descriptive Account of a New Method of Treating Old Ulcers of the Legs, by Thomas Baynton, Surgeon at Bristol. Edit.* 2. 1799.)

OF ULCERS ATTENDED WITH SOME SPECIFIC DISEASED ACTION, EITHER CONSTITUTIONAL, OR LOCAL.

1. *Ulcers which yield to Mercury.*

Here we shall exclude from consideration venereal ulcers, as this subject is treated of in the article *Venereal Disease*. At present, we shall only notice such sores, as are produced by other diseases of the general system, or of the parts, and are capable of being cured by mercury.

Perhaps, there is no greater source of error in the whole practice of surgery, than the supposition, that a sore, when it yields to mercury, must be a syphilitic one. Surgeons, however, who run into this absurdity, can hardly be imagined to be unaware, that so potent a medicine must have effects on numerous diseases of very different descriptions. Mr. Home very truly remarks, that many ulcers, unconnected with the venereal disease, which receive no benefit from other medicines, heal under a mercurial course, or yield to mercurial applications. In some cases, the ulcer remains in the same state, while mercury is used; but, begins to look better, as soon as the medicine is discontinued, in consequence of the beneficial change, produced in the system by the mercurial course. In these cases, mercurial frictions are the best, because they occasion least impairment of the constitution, in consequence of the stomach continuing undisturbed, and capable of digesting well.

Another description of ulcers, noticed by Mr. Home, as deriving benefit from mercury, occur on the instep and foot, have a very thickened edge, and are attended with a diseased state of the surrounding skin, so as to bear some resemblance to elephantiasis. They are frequently observed affecting servants, who live in opulent families, in an indolent and luxurious way. Mr. Home states, that fumigations with the hydrargyrus sulphuratus ruber heal these ulcers, and resolve in a great degree the swelling of the surrounding parts. In some instances, an ointment of calomel and hog's lard; in others, the camphorated weak mercurial ointment, is the best application.

Many diseased ulcers, particularly superficial ones, with a thickened edge, may be healed, when they are dressed with a solution of one grain of the hydrargyrus muriatus, in an ounce of water, containing a little spirit.

2. *Ulcers, which are curable by Hemlock.*

Mr. Home places more reliance on hemlock, as an external, than an internal remedy, for ulcers. The ulcers, which usually receive benefit from hemlock applications, look like those of an irritable sort; but, the surrounding parts are thickened, in consequence of some diseased action. Such sores occur near the ankle; which joint is at the same time enlarged. Sometimes, but not so often, they take place over the ligaments of the knee. On account of their situation, and the swelling of the joint, they may be suspected to be scrophulous, though they are more sensible, than strumous ulcers usually are. The sores, just described, are rendered less painful, their diseased disposition is checked, and the swelling of the joint diminished, by hemlock. Several irritable scrophulous ulcers are also particularly benefited by this medicine.

Mr. Home gives the preference to hemlock poultices, unless their weight should be objectionable, in which cases, he advises lint to be dipped in a decoction of the herb, and put on the sore.

Of the ointment, made with the inspissated juice, Mr. Home seems to say little, in regard to its efficacy.

3. *Ulcers which may be cured by Salt Water.*

Mr. Home takes notice of other specific ulcers, which yield to this application, after resisting other remedies. Poultices, made with sea-water, are often employed; but, this gentleman, seems to prefer keeping the part immersed in the water in a tepid state, about a quarter of an hour, twice a day.

When sea-water poultices bring out pimples, in cases of scrophulous ulcers on the legs and feet, Mr. Home informs us, that this disagreeable circumstance may be obviated by diluting such water with an equal quantity of a decoction of poppies. After a time, the salt water may be tried by itself again. While each fresh poultice is preparing, the

part should also be immersed in such water warmed.

When there is a tendency to anasarca, or when there is an unusual coldness in the limb, unattended with any propensity to mortification, tepid salt-water may be used with infinite advantage.

4. Ulcers, which may be cured by the Argentum Nitratum.

Mr. Home notices, under this head, an ulcer, which does not penetrate more deeply, than the cutis; but, spreads in all directions, producing ulceration on the surface of the skin, and often extending nearly through its whole thickness. The part, first affected, heals, while the skin beyond is in a state of ulceration.

Of this description are, a leprous eruption, mostly seen in men impressed in Ireland; a disease of the skin induced by buboes, which have continued a great while after the venereal virus has been destroyed; and the ring-worm.

All these diseases are most easily cured by applying to them a solution of the argentum nitratum.

The leprous eruption is communicated by contact, and makes its appearance in the form of a boil. This is converted into an ulcer, which discharges a fetid fluid, by which the surrounding skin is excoriated, and the ulceration is extended over a large surface. The pain is the most severe, and the discharge greatest, in hot weather. The parts first diseased heal, while others are becoming ulcerated, and the disease is always rendered worse, by spirituous liquors, salt provisions, and catching cold.

Mr. Home remarks, that the disease in the skin, produced by the effects of very irritable buboes, in constitutions broken down by mercury, is attended with ulceration of a more violent, deep, and painful kind, than the foregoing distemper. The progress of this disorder is, in other respects, very similar to that of the leprous eruption.

Although the ring worm only occurs in the form of an ulcer in warm climates, a mild species of the affection takes place in summer-time in this country. It seems to be infectious; though it often occurs without infection. It commences with an efflorescence, which is attended with very trivial swelling, and spreads from a central point. The circumference of the efflorescence becomes raised into a welt, while the rest assumes a scurfy appearance. The welt becomes covered with a scab, which falls off, and leaves an ulcerated ring, in general, not more, than a quarter of an inch wide. The outer margin of this ring continues to ulcerate, while the inner one heals, so that the circle gets larger and larger. The discharge consists of a thin, acrid fluid, which seems to have a great share in making the disease spread.

For all the three preceding diseases, a solution of the argentum nitratum is strongly recommended by Mr. Home.

5. Ulcers, which yield to Arsenic.

The sores, which are named *noli me tangere*, derive great benefit from this powerful remedy. Mr. Home observes, that they are nearly allied to cancer, differing from it in not contaminating the neighbouring parts by absorption, and only spreading by immediate contact.

From some cases, which fell under Mr. Home's observation, he discovered, that arsenic was not only efficacious as an external, but also as an internal remedy. I shall not unnecessarily enlarge upon this subject in the present place, as the reader may refer to the articles *Arsenic*, *Cancer*, and *Noli Me Tangere*, for additional information, relative to the uses of this potent mineral in the practice of surgery.

Mr. Home is an advocate for its employment, both internally and externally, for ulcers of untoward appearance on the legs. The *fungated* ulcer is particularly pointed out by this gentleman as being benefited by arsenic. This ulcer occurs on the calf of the leg, and on the sole of the foot. From its surface, a fungus shoots out, which is entirely different from common granulations. The new formed substance is radiated in its structure, the bottom of the ulcer being the central point, and the external surface, which is continually increasing, the circumference. The substance of this fungus is very tender, and readily bleeds. The first stage of the disease sometimes has the appearance of a scrophulous affection of the metatarsal bones; but, the parts seem more enlarged, and, when the skin ulcerates, a fungus shoots out, and betrays the nature of the case.

One species of the fungated ulcer is capable of contaminating the lymphatic glands; the other is not so. The first is represented by Mr. Home as being incurable by arsenic, or any other known medicine.

The second yields to this remedy. Mr. Home uses a saturated solution, made by boiling white arsenic in water, for several hours, in a sand heat. He gives from three to ten drops internally; and, for outward use, dilutes a dram with two pints of water, making it afterwards gradually stronger and stronger, till it is of double strength. The application may either be made in the form of a poultice, or by dipping lint in the lotion.

The best and safest preparation of

arsenic, both for internal and external use, is the kali arsenicatum. The mode of employing it may be learnt by turning to the articles *Arsenic*, *Aqua Kali Arsenicati*, *Noli Me Tangere*, &c.

6. *Ulcers attended with Varicose Veins.*

A certain kind of ulcer is very apt to occur on the inside of the leg, and is equally difficult to cure, and liable to break out again. It has the look of a mild, indolent, sore; but, the branches and trunk of the vena saphena are enlarged, and this varix of the veins keeps the ulcer from healing. The sore is seldom deep, usually spreads along the surface, and has an oval shape, the ends of which are vertically situated. There is a pain affecting the limb rather deeply, extending up in the course of the veins, and exasperated by keeping the leg a long while in an erect posture.

This is a kind of ulcer, which derives immense benefit from a tight roller, applied from the toes to the knee, although the direct operation of the pressure of the bandage on the sore is itself productive of no particular good.

Mr. Home found, however, that many patients could not bear to wear laced stockings, or tight bandages, and that some received no relief from them. Hence, this gentleman was led to consider what else could be done for the cure of the varicose state of the veins. He represents, that, in consequence of the size of the vena saphena, and its numberless convolutions, the return of blood from the smaller branches is so impeded, as to retard the circulation in the smaller arteries, and to interfere with their action in forming healthy granulations. The coats, and valves of the veins also become thickened, so that the latter parts (the valves) do not do their office of supporting the weight of the column of blood.

These reflections induced Mr. Home to think, that some benefit might be obtained by taking off a part of the pressure of this column of blood, by making a ligature round the vena saphena, where this vessel passes over the knee-joint. Thus the cavity of the vein at this part would be obliterated, and a kind of artifical valve would be formed.

This gentleman recommends the following way of performing the operation: "As the veins are only turgid in the erect posture, the operation should be performed while the patient is standing; and if placed upon a table, on which there is a chair, the back of the chair will serve him to rest upon, and he will have the knee-joint at a very convenient height for the surgeon. The leg to be operated upon must stand with the inner ankle facing the light, which will expose very advantageously the enlarged vena saphena passing over the knee-joint. While the patient is in this posture, if a fold of the skin, which is very loose at this part, is pinched up transversely, and kept in that position by the finger and thumb of the surgeon, on one side, and of an assistant on the other, this fold may be divided by a pointed scalpel, pushed through with the back of the knife towards the limb to prevent the vein being wounded; much in the same way, as the skin is divided in making an issue. This will expose the vein sufficiently; but, there is commonly a thin membranous fascia confining it in its situation; and, when that is met with, the vein had better be laterally disengaged by the point of the knife. This is most expeditiously done by laying hold of the fascia with a pair of dissecting forceps, and dividing it; for it is difficult to cut upon parts, which give little resistance, and there is a risk of wounding the vein. After this a silver crooked needle, with the point rounded off, will readily force its way through the cellular membrane connected with the vein, without any danger of wounding the vessel, and carry a ligature round it. This part, or, indeed, what may be considered as the whole of the operation, being finished, the patient had better be put to bed, so as to allow the vein to be in its easiest state, before the ligature is tied, and then a knot is to be made upon the vein: this gives some pain; but, it is by no means severe. The edges of the wound in the skin are now to be brought together by sticking plaster, except where the ligature passes out, and a compress and bandage applied, so as to keep up a moderate degree of pressure on the veins, both above and below the part included in the ligature." (*Home on Ulcers, p.* 296. *edit.* 2.)

It appears that A. Paré proposed and performed an operation, similar to the one described by Mr. Home. See *A. Paré's Works, translated by Johnson; folio edition, page* 319.

For information on the foregoing subject, consult *Underwood's Surgical Tracts on Ulcers, &c.* 1799; *B. Bell's System of Surgery; Baynton's Descriptive Account of a new Method of Treating Old Ulcers of the Legs*, 1799, *edit.* 2; *Whately's Practical Observations on the Cure of Wounds and Ulcers on the Legs, without Rest*, 1799; *Practical Observations on the Treatment of Ulcers on the Legs, to which are added, some Observations on Varicose Veins and Piles, by Everard Home, F. R. S.* 1801, *edit.* 2.; *Principles of Surgery, by John Bell, Vol.* 1. 1801; *Hunter on the Blood, Inflammation, &c.*

UNGUENTUM ACIDI VITRIOLICI.—℞. Acidi Vitriolici ʒj. Adipis Suillæ præparatæ ʒj.—These are to be well mixed together in a glass mortar.

This ointment is said to have been used by Dr. Duncan, of Edinburgh, for curing the itch. It has the character also of being able to reduce some chronic swellings of the joints. Mr. Naylor, of Gloucester, has employed frictions with this ointment, containing a good deal of camphor, for the purpose of reducing the swelling of the thyroid gland, in cases of bronchocele.

As the vitriolic acid is particularly destructive of vegetable substances, the parts to which this ointment is applied, should always be covered with flannel instead of linen.

UNGUENTUM CALCIS HYDRARGYRI ALBÆ.—℞. Calcis Hydrargyri Albæ ʒj. Adipis Suillæ præparatæ ʒiss. Misce.—Useful for several cutaneous diseases.

UNGUENTUM CANTHARIDIS.—℞. Cantharid. Pulv. ʒij. Aquæ Distillatæ ʒviij. Unguent. Resinæ Flavæ ʒviij. Boil the water with the cantharides, till one half of the fluid has evaporated. Then strain the rest, to which add the ointment of yellow resin. Evaporate the mixture in a water bath, saturated with sea-salt, until it is of the consistence of an ointment.

UNGUENTUM CERÆ.—℞. Ceræ Albæ ʒiv. Spermatis-Ceti ʒiij. Olei Olivæ ℔j. These are to be melted with a slow fire, and then briskly stirred till cold.—This, spread on lint, serves as a simple dressing for wounds, ulcers, &c.

UNGUENTUM CERÆ CUM ACETO.—℞. Ceræ Albæ ʒiv. Olei Olivæ ℔j. Aceti Distillati ʒij. The vinegar is to be gradually mixed with the two first ingredients, after these have been melted together. Dr. Cheston recommends this ointment for superficial excoriations, cutaneous eruptions, &c.

UNGUENTUM CERUSSÆ ACETATÆ.—℞. Cerussæ Acetatæ ʒij. Ceræ Albæ ʒij. Olei Olivæ ℔ss. Rub the acetated ceruse (previously powdered) with part of the olive oil. Then add it to the wax melted with the rest of the oil. Stir the mixture until cold. This is a very good saturnine application, in cases which require it to be made in the form of an ointment.

UNGUENTUM CICUTÆ.—℞. Foliorum Cicutæ recentium, Adipis Suillæ præparatæ, sing. ʒiv. The cicuta is to be bruised in a marble mortar, after which, the lard is to be added, and the two ingredients thoroughly incorporated by beating. They are then to be gently melted over the fire, and after being strained through a cloth, and the fibrous part of the hemlock well pressed, the ointment is to be stirred till quite cold. To cancerous or scrophulous sores, this ointment may be applied with a prospect of advantage. (*Pharm. Chirurg.*)

The Pharmacopœia of St. Bartholomew's Hospital directs the unguentum cicutæ to be made as follows:—℞. Foliorum Cicutæ ℔j. Adipis Suillæ ℔iss. Boil the leaves in the melted hog's-lard, until they become crisp. Then strain the ointment.

An hemlock ointment might be more conveniently made, by mixing the succus cicutæ spissatus, with any common salve.

UNGUENTUM DIGITALIS.—℞. Foliorum Digitalis Purpureæ recentium. Adipis Suillæ præparatæ, sing. ʒiv. This ointment may be made in the same manner as the unguentum cicutæ, and tried in the same cases as the latter.

UNGUENTUM ELEMI COMPOSITUM.—℞. Elemi ℔j. Terebinthinæ ʒx. Sevi Ovilli præparati ℔ij. Olei Olivæ ʒij. Melt the elemi with the suet; remove them from the fire, and mix them immediately with the turpentine and oil. Then strain the mixture.—Sometimes employed for dressing ulcers, which stand in need of stimulating applications.

UNGUENTUM GALLÆ CAMPHORATUM.—℞. Gallarum Pulveris Subtilissimi ʒij. Camphoræ ʒss. Adipis Suillæ præparatæ ʒij. Misce.—This is a very good application to piles, after their inflammatory state has been diminished by the lotio aq. litharg. acet. and leeches.

UNGUENTUM HELLEBORI ALBI.—℞. Hellebori Albi Pulv. ʒj. Adipis Suillæ præparatæ ʒiv. Olei Limonis ℥ss. Misce.—This ointment will cure the itch, and several other cutaneous diseases. Tinea capitis will sometimes yield to it.

UNGUENTUM HYDRARGYRI FORTIUS.—℞. Hydrargyri purificati ℔ij. Adipis Suillæ præparatæ ʒxxiii. Sevi Ovilli præparati ʒj. First rub the quicksilver with the suet, and a little of the hog's-lard, until the globules disappear; then add the remainder of the lard, and make an ointment.—This is the common, strong, mercurial ointment. Of its uses we need say nothing in this place.

UNGUENTUM HYDRARGYRI CAMPHORATUM.—℞. Unguenti Hydrargyri ʒj. Camphoræ ʒss. Misce.—This is often recommended to be rubbed on thickened, indurated parts, with a view of exciting the action of the absorbents. Rubbed along the course of the urethra, it is very serviceable in diminishing and removing chordee.

UNGUENTUM HYDRARGYRI

MITIUS.—℞. Unguenti Hydrargyri fort. ℔j. Adipis Suillæ præparatæ ℔ij. Misce.—The weaker mercurial ointment is often rubbed on indurated, thickened parts and tumours, when the object is merely to promote their absorption; and, it is not advisable to employ the unguentum hydrargyri fort. lest a salivation should be induced.

UNGUENTUM HYDRARGYRI NITRATI.—℞. Hydrarg. Purificati ℥j. Acidi Nitrosi ℥ij. Adipis Suillæ præparatæ ℔j. Dissolve the quicksilver in the nitrous acid; and whilst the solution is yet hot, mix with it the hog's-lard, previously melted, but beginning to concrete, by being exposed to the air. This ointment is a celebrated application to the inside of the eyelids, in cases of chronic ophthalmy, and also to specks on the cornea. When blended with a little olive oil, it also forms a very eligible stimulating dressing for numerous kinds of sores. It is very efficacious in curing tinea capitis, and many other herpetic and cutaneous diseases.

UNGUENTUM HYDRARGYRI NITRATI RUBRI.—℞. Hydrargyri Nitrati Rubri ℥iss. Ceræ Albæ ℥iv. Olei Olivæ ℥viij. Misce.—This is a most common application to indolent ulcers, and sores in general, which require being stimulated.

UNGUENTUM LITHARGYRI ACETATI.—℞. Aquæ Lithargyri Acetati ℥v. Adipis Suillæ ℔j. Ceræ Albæ ℥iv. Melt the ingredients together, and continue to stir them till cold.—This is an excellent saturnine ointment for ulcers with inflamed edges, and it may be employed with great advantage as a simple dressing in numerous instances.

UNGUENTUM OPHTHALMICUM.—℞. Adipis Suillæ præparatæ ℥ss. Tutiæ præparatæ, Bol. Armen. sing. ʒij. Calcis Hydrarg. Albæ ʒj. Misce.—This is Janin's celebrated ophthalmic ointment, which may be used for the same diseases of the eye and eyelids, as the unguentum hydrargyri nitrati. It must be at first weakened with about twice its quantity of hog's-lard.

UNGUENTUM PICIS.—℞. Picis, Sevi Ovilli præparati, sing. ℔ss. Melt, and then strain them.

UNGUENTUM PICIS COMPOSITUM.—℞. Unguenti Picis, Unguenti Cerussæ Acetatæ, sing. ℔ss. Misce.

The two preceding ointments are applicable to cases of tinea capitis, and some eruptive complaints. Also to some kinds of irritable ulcers.

UNGUENTUM PICIS CUM SULPHURE.—℞. Unguenti Picis, Unguenti Sulphuris, sing. ℥iv. Misce.—This is the most common, and, I believe, the most efficacious, application for curing tinea capitis.

UNGUENTUM RESINÆ FLAVÆ.—℞. Resinæ Flavæ, Ceræ Flavæ, sing. ℔j. Olei Olivæ ℔j. Melt the resin and wax with a slow fire; then add the oil, and strain the mixture while hot.—This is a common application to ulcers, which stand in need of being gently stimulated.

UNGUENTUM SAMBUCI.—℞. Florum Sambuci, Adipis Suillæ, singulorum ℔j. The hog's lard being melted, boil the elder-flowers in it till they become crisp, then strain the mixture.

UNGUENTUM SPERMATIS-CETI.—℞. Spermatis-Ceti ʒvj. Ceræ Albæ ʒij. Olei Olivæ ℥iij. Melt them together with a slow fire, and then stir them briskly till cold.—This is the common white dressing, so extensively used by surgeons as a simple salve.

UNGUENTUM SULPHURIS.—℞. Adipis Suillæ ℔ss. Florum Sulphuris ℥iv. Misce.

UNGUENTUM TUTIÆ.—℞. Tutiæ præparatæ, Unguenti Spermatis-Ceti, q. s. Misce.—Used for smearing the borders and inside of the eyelids, in cases of chronic ophthalmy, &c.

UNGUENTUM TUTIÆ COMPOSITUM.—℞. Tutiæ præparatæ, Lapidis Calaminaris præparati, sing. ʒvj. Camphoræ ʒij. Unguenti Sambuci ℔j. Misce.—This formula is contained in the Pharmacopœia of St. Bartholomew's Hospital. It may be applied, in some cases, to the inside of the eyelids, also to piles; certain ulcerations, excoriations, &c.

UNGUENTUM ZINCI CALCINATI.—℞. Florum Zinci ℥ij. Unguentum Spermatis-Ceti lbj. Misce.—Sometimes used in the same affections of the eye and eye-lids, in which the unguentum hydrargyri nitrati, and the unguentum ophthalmicum, are employed.

UNGUIS. (*A Nail.*) Some surgical authors have applied this term to a collection of pus, or matter in the eye, when the abscess has appeared, through the cornea, to be shaped like a finger nail.

UNGULA. (*A Hoof.*) A collection of matter in the eye, shaped like a hoof.

UNION BY THE FIRST INTENTION.—When the opposite surfaces of a wound are brought into contact, and grow together at once, without suppurating, union by the first intention is said to have taken place. When wounds heal by suppurating, granulating, &c. they are sometimes surgically described as getting well by the second intention. See *Wounds*.

URETHRA, STRICTURES OF. Mr. Hunter informs us, that most obstructions to the passage of the urine, if not all, are attended with nearly the same symptoms. Few persons take notice of the first symptoms of a stricture, till they have either become violent, or

other inconveniencies have been the consequence. A patient may have a considerable stricture, and yet be unconscious, that his urine does not freely come away; he may often have, in consequence of a stricture, a tendency to inflammation and suppuration in the perinæum, without feeling any obstruction to the passage of his urine, or suspecting that he has any other complaint.

There are three kinds of strictures; viz. the true permanent one, which arises from an alteration in the structure of a part of the urethra; the mixed case, consisting of a permanent stricture and a spasm; and, thirdly, the true spasmodic stricture.

In all these obstructions, Mr. Hunter remarks, that the stream of water becomes small in proportion to the stoppage; but, though this symptom is probably the first, it is not always observed by the patient. In some instances, the water is voided only in drops, and then it cannot escape notice. In other cases, the stream of urine is forked, or scattered. Under such circumstances, Mr. Hunter recommends the passage to be examined with a bougie; and, if one of a common size can be readily introduced, the difficulty of voiding the urine is likely to depend on a diseased enlargement of the prostate gland, which should, therefore be examined. See *Prostate Gland.*

The spasmodic stricture may be known by its being only of temporary duration. This kind of case, and more particularly the permanent stricture, are generally attended with a gleet. The latter complaint is often for a long while suspected as being the only one, and the surgeon finds all his efforts, to effect a cure, fruitless.

In diseases of the urethra, and also of the prostate gland and bladder, there is commonly an uneasiness about the perinæum, anus, and lower part of the abdomen. (*Hunter.*)

The first progress of the contraction is, in general, very slow; but, when once it has so far increased, that the urethra is not wholly relaxed by the force of the urine, its subsequent advances are more rapid, and new symptoms are perceived. The urine is voided more frequently, does not pass without a considerable effort, attended with pain, and a straining sensation continues, after the bladder is emptied. If the patient accidently catches cold, drinks a glass of spirituous liquor, acid beverage, or punch, commits an excess in drinking wine, or removes quickly from a warm to a cold climate, the urine will, perhaps, pass only in drops, or be entirely obstructed. These causes induce, in the contracted part, a spasmodic action, by which it is closed. Cold, externally applied to the body, has so great an effect upon a spasmodic stricture, that a patient, who can make water without the smallest difficulty in a warm room, is often quite unable to void a drop, on making the attempt in the open air. However, on returning to a warm room, and sitting down a little while, he becomes able again to expel his urine. The symptoms of a stricture are more frequent in persons, who lead a sedentary life, than in others who lead an active one. (*Home.*)

Strictures in the urethra, being attended with a discharge and pain in making water, especially after any excess, are frequently regarded and treated as a gonorrhœa. These two symptoms often come on a few hours after connexions with women; the degree of inflammation is very slight; the discharge is the first symptom, and is more violent at the commencement, than at any other period. The inflammation subsides in a few days, leaving only the discharge, which also frequently disappears in five or six days, whether any means are employed or not, for its removal. (*Home.*)

What renders a stricture particularly apt to be mistaken for a gonorrhœa, is the circumstance that, in both diseases, the pain in making water is experienced about an inch and a half from the orifice of the glans penis.

In a more advanced stage, the strictured part of the urethra is always much narrower, than the rest of the canal. However, it retains the power of becoming contracted and relaxed. In the contracted state, the passage is closed up; in the relaxed, the urine can pass through it in a small stream.

The spasmodic contraction must act with considerable force, since the urine cannot even pass in a small stream, and a small bougie, which, in a relaxed state of the urethra, met with no resistance, can now be scarcely introduced at all. Also, if the bougie be allowed to remain for a few minutes in the stricture, it is not unfrequently grasped so tightly by the spasmodic contraction, that, when an attempt is made to withdraw it, some force is requisite to succeed. The bougie when examined, seems as if it had had an impression made round it by a piece of packthread. (*Home.*)

In old cases of stricture, the muscular coat of the bladder becomes thickened and stronger, then natural, in consequence of more force being necessary to propel the urine through the obstructed part. The bladder, in this thickened state, does not admit of the usual dilation, so that the patient is obliged to make water very frequently, and he is unable to pass the whole night without

making this evacuation once or twice. (*Home.*)

A nocturnal emission of the semen is another very common symptom of a stricture; and some patients seem to have no other complaint attendant on the affection of the urethra.

A periodical discharge is sometimes brought on by cold, or other occasional causes. The inflammation extends to the bladder; the frequency of making water is very much increased, and the urine very turbid. It is voided for twelve, or twenty-four hours, once or even twice every hour; and, when allowed to stand, it deposits a substance in the form of powder, consisting of coagulable lymph. This is the slightest kind of attack.

Sometimes the bladder is inflamed in a greater degree, and secretes pus, which is discharged with the urine. In a still more violent attack, the discharge is similar to the white of an egg, and particularly adhesive. Mr. Home states, that it has been discovered by examinations after death, to be the vitiated secretion of the prostate gland. When the inflammation of the bladder becomes still worse, the affection sometimes extends to the peritoneum, and the patient dies.

Since strictures of long standing always impede the passage of the urine, the bladder acts with augmented force to overcome the resistance. In this manner, the stricture is kept in a continual state of irritation, and made to contract in a greater degree.

In a few cases, indeed, the diseased part of the urethra is rendered quite impervious; and the patient's life is preserved by the urethra ulcerating, at some point within the obstruction, and fistulous openings taking place in the perinæum. See *Fistulæ in Perinæo.*

Strictures are frequently attended with constitutional symptoms, one of the most common of which, in warm climates, is a complete paroxysm of fever. The cold fit is very severe; this is followed by a hot fit, and then a very profuse perspiration. During the rigor, nausea and vomiting generally occur, and at this period the patient has occasion to make water frequently, seldom experiencing at the same time any strangury. When the fit is tolerably complete, the patient suffers, in general, only one; in the opposite circumstance, two; but, a greater number rarely happen. Such febrile paroxysms are not frequent in cold countries; but do every now and then take place, particularly in consequence of exposure to cold, excesses, and the introduction both of common and armed bougies.

With regard to the formation of strictures, Mr. Home has noticed, that the membrane of the urethra, like every other muscular structure, is liable to a spasmodic contraction, in which state the canal loses the power of relaxing itself again, till the spasm is removed. This spasmodic stricture is only a wrong action of the urethra; and, if the parts could be examined in their relaxed state, there would be no appearance of disease.

A part of the urethra, once disposed to become preternaturally contracted, generally becomes more and more affected in this manner, and, at last, becomes permanently narrower. The case now becomes both a permanent stricture and a spasmodic one; being so far permanent, that it is always narrower, than the rest of the canal, and so far spasmodic, that it may become contracted in a still greater degree.

When the contraction is not considerable, it appears, on examination after death, to be merely a narrowing of the urethra; but a permanent stricture, in a more advanced state, usually consists of a ridge, which forms a projection in the passage. (*Home.*)

Mr. Hunter informs us, that the disease generally occupies no great length of the passage; at least, that this was the case in most of the instances, which he had seen. In these the contraction was not broader, than if it had been produced by surrounding the urethra with a piece of packthread; and in many it had a good deal of the appearance, which one may fancy such a cause would produce. Mr. Hunter states, however, that he had seen the urethra contracted for above an inch in length, owing to its coats, or internal membrane, being irregularly thickened, and forming a winding canal.

A stricture does not always arise from an equal contraction of the urethra all round; for, in some instances, the contraction is only on one side. This contraction of one side of the canal only throws the passage to the opposite side, which often renders the introduction of a bougie difficult. The contracted part is whiter, than any part of the urethra, and is harder in its consistence. In some few cases, there are more strictures, than one. Mr. Hunter mentions his having seen half a dozen in one urethra, and he observes, that a stricture is frequently attended with small tightnesses in other parts of the urethra.

Mr. Hunter remarks, that every part of the urethra is not equally subject to strictures, the bulbous portion being much the most subject to the disease. A stricture is sometimes situated on this side of the bulb, but very seldom beyond it, that is, nearer the bladder.

Mr. Hunter never saw a stricture in that part of the urethra, which passes through the prostate gland; and the bulb, besides being the most frequent seat of this disease, is also subject to it in its worst forms. (*Hunter.*)

Mr. Home has measured the length of the urethra in different subjects, and examined the diameters of the several parts of the passage. Strictures, according to this gentleman, occur most commonly just behind the bulb of the urethra, the distance from the external orifice being $6\frac{1}{2}$, or 7 inches. The situation, next in the order of frequency, is about $4\frac{1}{2}$ inches from the orifice of the glans. The disease does also occur at $3\frac{1}{2}$ inches, and, sometimes, almost close to the external orifice. The two parts of the urethra, most frequently affected with strictures, are naturally the narrowest. Sometimes the very orifice of the urethra is contracted, and the circumstance often leads to an erroneous supposition, that the whole canal is naturally formed of the same size. The prepuce also is observed to be particularly often affected with a natural phymosis, in persons, who have strictures in the urethra.

In almost all the cases, which Mr. Home has met with, there has been one stricture, about seven inches from the external orifice, whether there were any others, or not.

With respect to the causes of strictures, some writers have imputed the disorder to the effects of the venereal disease, and often to the method of cure. Mr. Hunter, however, entertained very strong doubts, whether strictures commonly, or even ever, proceeded from these causes; though he acknowledges, that since most men have had venereal complaints, a refutation of the above opinion is very difficult. Mr. Hunter was led to think, that strictures did not commonly arise from venereal causes, from reflecting that strictures are common to most passages in the human body. They often take place in the œsophagus; the intestines, particularly, the rectum; the anus; the prepuce, so as to produce phymosis; and in the lachrymal duct, so as to occasion a fistula lachrymalis. Strictures sometimes take place, when there have been no previous venereal complaints. Mr. Hunter mentions his having seen an instance of this kind in a young man, nineteen years of age, who had had the complaint for eight years, and which therefore began, when he was only eleven years old. He was of a weak, scrophulous habit. Mr. Hunter had also seen a stricture in a boy only four years old, and a fistula in perinæo in consequence of it. Strictures happen as frequently in persons, who have had the gonorrhœa in a slight degree, as in others, who have had it in a severe form.

Many believe, that strictures arise from the use of injections in the treatment of the gonorrhœa; but, Mr. Hunter thought, that this opinion was founded on prejudice, and he states, that he had seen as many strictures after gonorrhœas, which had been cured without injections, as after those, which had been treated with these latter applications.

Mr. Hunter also disbelieved the idea, that strictures are a consequence of ulcers in the urethra; for, ulcers hardly ever occur in this passage, except when there are strictures. It is now generally admitted, that, in gonorrhœa, no sores exist in the urethra.

TREATMENT OF STRICTURES, WITH COMMON BOUGIES, ON THE PRINCIPLE OF DILATATION.

Mr. Hunter remarks, that the cure of strictures may be accomplished, either by a dilatation of the contracted part, or a destruction of it by ulceration, or escharotics. The dilatation is accomplished by means of bougies; but, Mr. Hunter considered, that a cure, thus effected, was seldom or never more, than temporary. The removal of the stricture by ulceration, may also be done with bougies; its destruction with caustic used formerly to be done through a cannula, contrived for the purpose; but, is now performed by means of what are termed *armed bougies*.

The cure by dilatation is principally mechanical, when effected by bougies, the powers of which are generally those of a wedge. However, Mr. Hunter remarks, that their ultimate effect is not always so simple as that of a wedge upon inanimate matter; for, pressure makes living parts either adapt themselves to their new position, or else recede by ulceration. Bougies, of course, either dilate strictures, or make them ulcerate.

The disease has generally made considerable progress, before the patient seeks surgical assistance, and the stricture may be so advanced, that a small bougie cannot be made to pass, without a great deal of trouble. If the end of a small bougie, let it be ever so small, can be introduced through the stricture, the cure is then in our power. However, a small bougie frequently cannot be passed in the first instance, and even not after repeated trials.

Often, when the stricture is very considerable, a great deal of trouble is given by occasional spasms, which either resist the introduction of a bougie altogether, or only allow a very small one to pass. At other periods, however, a larger one may be introduced. In these circum-

stances, Mr. Hunter mentions, that he was sometimes able to get the point of a bougie to enter, by rubbing the outside of the perinæum with the finger of one hand, while he pushed the bougie on with the other. The same eminent practitioner also often succeeded by letting the bougie remain a little while close to the stricture, and then pushing it on. Sometimes, the spasm may also be taken off by dipping the glans penis in cold water.

Although, in cases of permanent strictures, the bougie may not pass at first, yet, after repeated trials, it will every now and then find its way. In this manner, future attempts become more certain and easy.

However, the success of the subsequent trials, to introduce a bougie does not always depend on the instrument having been once, or twice passed. Sometimes, it can be introduced to-day; but, not to-morrow; and, in this state, the case shall continue for weeks, notwithstanding every trial we can make. Mr. Hunter observes, however, that, in general, the introduction of the bougie becomes gradually less difficult, and, therefore, that we ought not to despair of success in any case.

When the passage is very small, it is not easy to know, whether the bougie has entered the stricture, or not: for bougies, so slender as those, which must be at first employed, bend so very easily, that the surgeon is apt to fancy, that they are passing along the urethra, while they are only bending. Mr. Hunter advises the surgeon to make himself, at first, acquainted with the situation of the stricture, by means of a common-sized bougie. Then he is to take a smaller one, and when its point arrives at the stricture, the instrument is to be gently pushed forward; but, only for a short time. If the bougie has passed further into the penis, the surgeon may know how far it has entered the stricture by taking the pressure off the bougie. For, *if it recoil*, he may be sure, that *it has not passed*; at least, has not passed far; but, only bent. On the contrary, *if it remain fixed, and do not recoil, it has certainly entered the stricture.*

Mr. Hunter informs us, however, that the preceding remarks are not so applicable, when a very small bougie is employed, which may become bent, without our being aware of the circumstance.

A bougie may frequently be introduced a very little way, for instance, only one-tenth of an inch, and then it bends and cannot be pushed further. To determine whether this is the case, Mr. Hunter says, it is necessary to withdraw the bougie and examine its end. If the end be blunted, we may be sure that the bougie has not entered at all; but, if it be flattened, for an eighth, or tenth, of an inch, be grooved, or have its outer waxen coat pushed up to that extent; or, if there be a circular impression made upon the bougie, or only a dent on one side, made by the stricture; we may be sure, that the instrument has passed as far as these appearances extend. It then becomes necessary to introduce another of exactly the same size, and in the same manner, and to let it remain as long as the patient can bear it, or convenience will allow. By repetitions of this plan, the stricture will be overcome.

Mr. Hunter remarks, that the time, which each bougie ought to remain in the passage, must be determined by the feelings of the patient; for, if possible, no pain should ever be given. If the patient should experience very acute pain when the bougie is passing, it ought not to be left in the urethra above five, or, at most, ten minutes; or, not so long, if the pain be exceedingly severe. Each time of application should afterwards be lengthened so gradually as to be imperceptible to the feelings of the patient, and the irritability of the parts. Mr. Hunter affirms, that, he has known many patients, who could not bear a bougie to remain in the passage ten, or even five minutes, till after several days, and even weeks, but, who in time were able to wear the instrument for hours, and this, at last, without any difficulty. The best time for keeping a bougie in the urethra, is when the patient has least to do; or, in the morning, while he is in bed, if he can introduce the instrument himself.

Mr. Hunter next observes, that the bougie should be increased in size, according to the facility, with which the stricture becomes dilated, and the ease, with which the patient bears the dilatation. If the parts are very firm, or very irritable, the increase of the size of the bougie should be very slow, so as to allow them to become gradually adapted to the augmented size of the instrument. But, if the sensibility of the parts will allow, the increase of the size of the bougie may be somewhat quicker, but, never more sudden, than the patient can easily bear. The surgeon must continue to increase the size of the bougie, till one of the largest size can freely pass; nor should the use of this be discontinued till after three weeks, or a month, in order that the dilated part may have time to become habituated to its new position, and lose its disposition to contract again. However, Mr. Hunter believed, that the permanency of a cure, effected on the principle of dilatation, could seldom be depended upon.

CURE OF STRICTURES BY ULCERATION.

This is also accomplished by means of a

bougie, and the plan may be tried both when the instrument can, or cannot, be introduced through the stricture. In the first instance the method is less proper; because the stricture admits of being dilated.

In order to cure a stricture by making it ulcerate, the bougie is to be introduced as far through the contracted part as possible, and the size of the instrument is to be augmented, as fast as the sensations of the patient can well bear. In this manner, ulceration will be produced in the part, which is pressed, and, Mr. Hunter remarks, that the cure will be more lasting, because more of the stricture is destroyed, than when the parts are simply dilated. This eminent surgeon notices, however, that few patients will submit to this practice, and that few, indeed, would be able to bear it, since it is apt to bring on violent spasms in the part, attended with a very troublesome retention of urine.

If the smallest bougie cannot be made to pass a stricture, by using some degree of force, dilatation becomes impracticable; and, as the stricture must be destroyed, something else must be tried. In many cases, says Mr. Hunter, it may be proper to get rid of the stricture by making it ulcerate, or, in other words, be absorbed. Bougies, intended to excite ulceration, need not be so small, as in the foregoing cases, as they are not designed to be passed through the stricture; and, in consequence of being of the common size, they may be more surely applied to the parts, causing the obstruction. The force, applied to a bougie, in this case, should not be great; for, a stricture is the hardest part of the urethra; and if a bougie is forcibly pushed on, its end may slip off the stricture, before ulceration has commenced, and make a false passage for itself in the corpus spongiosum urethræ.

In trying to cure strictures by ulceration, the utmost attention must be paid; and, if the patient does not make water better, notwithstanding the bougie passes further, the surgeon may be sure, that he is forcing a false passage.

When the stricture has so far yielded, as to allow a small bougie to be introduced, the treatment is then to be conducted on the principle of dilatation.

Mr. Hunter observes, that whenever a bougie of a tolerable size, passes with ease, and the parts and the patient have become accustomed to it, the surgeon need no longer attend for the purpose of introducing it. The patient may now be allowed to introduce bougies himself; and when he can do this with ease, the business may be trusted to him, as he can make use of the instruments at the most convenient times, so that they may be, more frequently, and longer, applied. In the mean while, the surgeon should only pay occasional visits. Mr. Hunter adds, that, this practice of the patient, under the surgeon's eye, by which means, the former learns the art of introducing bougies, is the more necessary, since strictures are diseases, which commonly recur; and, therefore, no man, who has ever had a stricture, and is cured of it, should rely on the cure as lasting; but, should always be prepared for a return, and always have some bougies by him. He should not go a journey, even of a week, without them; and the number should be according to the time, which he is absent, and the place, to which he is going; for, in many parts of the world, he cannot be supplied with them.

To prevent the inconvenience of a bougie slipping out, or the mischief of its gliding into the urethra, a soft cotton thread must be tied round that end of the bougie, which is out of the urethra, and then round the root of the glans. This last part of the thread should be very loose. The projecting portion of the bougie should also be bent down upon the penis, by which means, it is rendered less troublesome, and more secure. (*Hunter* on the Venereal Disease.) When a considerable part of the bougie remains out of the urethra, surgeons usually clip a piece of it off.

CURE OF STRICTURES BY THE ARGENTUM NITRATUM.

Wiseman makes mention of the plan of curing strictures in the urethra by means of caustic. He observes, that, when the obstruction is a caruncle, and you cannot pass it, you may well conclude it is callous: "in which case, you may pass a cannula into the urethra to that caruncle, and, whilst you hold it there steady, you may convey a grain of caustic into the cannula, and press the caustic to it; and, whilst you hold it there, you will perceive its operation, by the pressing forward of the cannula."

About the year 1752, Mr. Hunter attended a chimney-sweeper, who had a stricture. Not finding, that any benefit was derived from the use of common bougies, for a space of six months, Mr. Hunter, unaware of the above passage in Wiseman, conceived, that the stricture might be destroyed by escharotics, and the first attempt, which he made, was with red precipitate. He put some salve on the end of a bougie, and then dipped it in red precipitate. The bougie, in this state, was passed down to the stricture; but, Mr. Hunter found, that it brought on considerable inflammation all along the

inside of the passage, as he thought, in consequence of the precipitate being rubbed off, while the bougie was passing to the stricture. Mr. Hunter then introduced a silver cannula down to the stricture, and passed the bougie with precipitate, as before, through the tube. As the patient, however, did not make water any better, and the smallest bougie could not be introduced through the stricture, he suspected, that the precipitate had not sufficient power to destroy the obstruction. Mr. Hunter was, therefore, induced to fasten a small piece of the argentum nitratum on the end of a piece of wire with sealing-wax, and introduce the caustic through the cannula to the stricture. After having made the application three times, at intervals of two days, he found, that the man voided his urine much more freely, and, on applying the caustic a fourth time, the cannula went through the stricture. A bougie was introduced for a little while afterwards, till the man had completely recovered.

Having experienced such success in the foregoing example, Mr. Hunter was encouraged to apply his mind to the invention of some instrument, better suited to the purpose, than the above contrivance. He succeeded in devising an improved instrument, although he acknowledges, that it was not perfectly adapted to strictures in every situation in the urethra. He remarks, that the caustic should be prevented from hurting the unaffected part of the urethra by introducing the active substance, through a cannula, down to the stricture; and it should be capable of protruding a little beyond the end of the cannula, by which means it will only act upon the stricture. The caustic should be fixed in a small portcrayon, and it is necessary to have a piece of silver of the length of the cannula, with a ring at one end, and a button at the other, of the same diameter as the cannula. The button forms a kind of plug, which should project beyond the end of the cannula in the urethra, so as to make a rounded end; or, Mr. Hunter says, the portcrayon may be formed with this button at its other end. The cannula, with the button, is to be passed into the urethra, and when it reaches the stricture, the silver plug should be withdrawn, and the portcrayon with the caustic introduced in its place; or, if the plug and portcrayon are on the same instrument, then it is only necessary to withdraw the plug, and introduce the portcrayon with the caustic. The plug, besides giving a smooth rounded end to the cannula, answers another good purpose, by preventing the tube from being filled with the mucus of the urethra, when the instrument is passing inward, which mucus would be collected in the end of the cannula, dissolve the caustic too soon, and hinder its application to the stricture.

When the stricture was beyond the straight part of the urethra, Mr. Hunter owned, that it was difficult to apply caustic to the disease through a cannula.

A better mode of applying lunar caustic to strictures, was afterwards devised by Hunter, and has since been extensively introduced into practice by Mr. Home. This gentleman directs us to take a bougie of a size, that can be readily passed down to the stricture, and to insert a small piece of lunar caustic into the end of it, letting the caustic be even with the surface, but surrounded every where laterally by the substance of the bougie. This should be done some little time before it is required to be used; for, the materials, of which the bougie is composed, become warm and soft by being handled in inserting the caustic; and, therefore, the hold, which the bougie has of the caustic, is rendered more secure after the wax has been allowed to cool and harden. The bougie thus prepared, is to be oiled and made ready for use; but, before passing it, a common bougie of the same size is to be introduced down to the stricture, in order to clear the canal, and to measure the exact distance of the stricture from the orifice of the urethra. This distance being marked upon the armed bougie, it is to be passed down to the stricture, as soon as the other is withdrawn. The caustic, in its passage, is scarcely allowed to come into contact with any part of the membrane, because the point of the bougie, of which the argentum nitratum forms the central part, always moves in the middle line of the canal; and, indeed, the quickness, with which it is conveyed to the stricture, prevents any injury of the membrane lining the passage, when the caustic accidentally touches it.

In this mode the caustic is passed down with little, or no irritation to the lining of the urethra, it is applied in the most advantageous manner to the stricture, and can be retained in that situation sufficiently long to produce the desired effect.

The reasons urged in favour of the employment of bougies armed with the lunar caustic, are: that a permanent cure is effected, which common bougies cannot accomplish; that the pain, arising from the application of the argentum nitratum to the stricture, is very inconsiderable; and that neither pain, nor inflammation are found to ensue. The meaning of these remarks, however, is to be received as a general one, liable to exceptions. Indeed, Mr. Home himself has candidly acknowledged, that some inconveniences occa-

sionally follow the use of armed bougies. But, what practice, however judicious and eligible, is altogether free from occasional ill-consequences? Mr. Home remarks, that against treating strictures of the urethra with caustic bougies, numerous objections have been adduced, and many bad consequences have been attributed to the practice, without any real foundation; "for, whatever, *à priori*, might be supposed the effects of so violent an application, to a membrane so sensible and irritable, as the urethra, and I will admit, that it is very natural to conceive they would be very severe, the result of experience, the only thing to be relied on, evinces the contrary. The pain, that is brought on, is by no means violent; and neither irritation, nor inflammation, is found to take place.

"That cases do occur, in which strictures have produced so much mischief, and rendered so great an extent of the canal diseased, that the use of the caustic has proved unsuccessful, is certainly true; and several of these cases have fallen within my own knowledge. But, when it is stated, that none, even of these, were made worse by its use; that no bad consequences attend it; and that no other mode, at present known, is equally efficacious; any occasional want of success, cannot be considered as an objection to this mode of practice.

"But if the apprehension of violent effects from the caustic, however ill-founded, cannot be removed, let the alternative be considered; namely, the only operation previously in use, where a stricture cannot be dilated by the bougie.

"In those cases, we are obliged to have recourse to means certainly more severe and violent, laying open with a knife the diseased urethra, and passing through the divided parts a flexible gum catheter into the bladder. This I have done myself, and have frequently seen it performed by Mr. Hunter, and it always succeeded; neither bringing on so much inflammation as was expected, nor being attended with any symptoms of irritation.

"This practice has by other surgeons been carried still further; the portion of diseased urethra has been dissected out, and entirely removed; nor has so severe an operation always brought on untoward symptoms; and patients have recovered.

"If the membrane of the urethra when diseased, is capable of suffering so much injury, without any consequent symptoms of irritation, it cannot be doubted that it will bear with impunity to be touched, in a very partial manner, several different times with lunar caustic."

Mr. Home afterwards informs us, that, "having met with a number of facts, from which a general principle appears to be established, that the irritable state of a stricture is kept up, and even increased, by the use of the bougie, but lessened and entirely destroyed by the application of lunar caustic; I am desirous to communicate my observations upon these facts, and to recommend the use of the caustic, in many cases of irritable stricture, *in preference to the bougie*.

"As the use of the caustic, upon this principle is, I believe, entirely new, and is contrary to every notion, that had been formed upon the subject, it will require something more, than general assertion, to gain even the attention of many of my readers, still more their belief; I shall therefore detail the circumstances, as they occurred, by which I conceive the propriety of this practice, to be established; and afterwards make some observations upon the principle on which it depends.

"My connexion in practice with Mr. Hunter, afforded me opportunities of attending to cases of stricture, in all their different stages; many of them brought on during a long residence in India, attended with great irritability, and exceedingly difficult of cure.

"One case of this kind (which Mr. Home has related) admitted the passing of a small bougie; but, in the course of three years, very little was gained by a steady perseverance in the use of that instrument, either in dilating the canal, or palliating the symptoms of stricture; this made me look upon the bougie as less efficacious, than I had always been taught to believe it. I was willing, however, to consider this as an uncommon case, depending more on the peculiarities of the patient's constitution, than on the nature of the disease: but, I found, on a particular enquiry, that several other gentlemen, from India, were under circumstances nearly similar; the bougie only preventing the increase of the stricture, but being unable to dilate it beyond a certain size; and when it was left off, the stricture in less than two months returned to its former state of contraction.

"What plan ought to be followed in such cases, I was then unable to determine; but, that the bougie could not be depended on was evident. During this suspense, the following case came under my care.

"In August, 1794, a gentleman consulted me for some symptoms, which had been considered as indicating the presence of gonorrhœa; but, as they did not yield to the common treatment in the usual time, he was induced to take my advice respecting the nature of his complaint. In the necessary enquiry, to obtain a perfect history of the case among other things it was stated, that, nineteen

years before, there was a stricture, which became very troublesome, and that Mr. Hunter, by the desire of the patient, had applied the caustic, by which the stricture was removed, and never afterwards returned. He said that he was one of the first persons on whom the caustic had been used. From this account, I was naturally led to believe that the stricture had gradually returned, and was now increased so much as to produce the present symptoms; a discharge being almost always a symptom of stricture, when it is much contracted; but, upon examining the canal, a bougie of full size, passed on to the bladder without the smallest impediment. I therefore took up the case as an inflammation in the urethra; and large doses of the balsam copaiva, given internally, effected a cure.

"The circumstance of a stricture having been removed nineteen years before, and not returning, made a strong impression on my mind; and made me desirous to ascertain, whether this practice could be employed in cases of stricture in general, and the cure produced by it, equally permanent. A short time afterwards, I had an opportunity of trying it in the following case.

"A captain in the East India Company's service, in September, 1794, applied to me for assistance. His complaints were, great irritation in the urethra and bladder, constant desire to make water, and an inability to void it, except in very small quantities. These symptoms had been at first supposed to arise from gonorrhœa, afterwards rendered more severe by catching cold; but, not yielding to the usual remedies for gonorrhœa, they were investigated more minutely, and a stricture was discovered in the urethra. The mode of treatment was now changed, and the bougie employed; but, its use aggravated all the symptoms, and brought on so great a degree of irritability in the bladder and urethra, that there was an alarm for the patient's life, which was the reason for applying for my assistance.

"Besides the local symptoms, this patient had those of quick pulse, white tongue, hot and dry skin, loss of appetite, and total want of sleep, with frequent attacks of spasm on the bladder and urethra. A very small flexible gum catheter was passed, and the water drawn off, in quantity about a pint, which gave him great relief; this was repeated morning and evening, to keep the bladder in as easy a state as possible; but, in other respects, he continued much the same.

"As the present symptoms were brought on by the use of the bougie, little good was to be expected from that instrument; and where the urethra had been so easily irritated, and was disposed to continue in that state, there was no prospect of the use of the bougie afterwards effecting a cure. These circumstances I explained to the patient; and mentioned, in proof of my opinion, the case, in which so little had been effected in three years.

"I then proposed to him a trial of the caustic, with a view to deaden the edge of the stricture, as the only probable means of effecting a cure. The degree of irritation was already great; I was, however, led to believe, that the application of the caustic was not likely to increase it; since, by destroying the irritable part, it might lessen, and even remove, the spasmodic affection; but if, contrary to my expectation, the irritation continued, we still should be able to draw off the water, as the slough formed by the caustic would prevent the edge of the stricture from acting, and obstructing the instrument.

"The application of the caustic was, upon these grounds, determined on; and it was applied in the following manner.

"I passed a common bougie, nearly the size of the canal, down to the stricture, to ascertain its exact situation, and to make the canal of the urethra as open as possible. The distance was then marked upon a bougie armed with caustic, of the same size, which was conveyed down as quickly as the nature of the operation would admit. It was retained upon the stricture, with a slight degree of pressure; at first, there was no pain from the caustic, but a soreness from pressure; in less than a minute, a change was felt in the sensation of the part, it was at first a heat, succeeded by the burning pain peculiar to caustic; as soon as this was distinctly felt, the bougie and caustic were withdrawn, having remained in the urethra about a minute altogether. The soreness, he said, was entirely local, by no means severe, was unaccompanied by irritation along the canal, and he thought the uneasiness in the bladder diminished by it. He described the pain as resembling very exactly the first symptoms of gonorrhœa. This sensation lasted half an hour after withdrawing the bougie.

"The caustic was applied about one o'clock in the forenoon, and he passed the day more free from irritation than he had been since the beginning of the attack, which had lasted six days. In the evening, the water was drawn off, with more ease than the night before. He passed a tolerable night, and, the next day, continued free from irritation. On the third day, the caustic was again applied in the forenoon; the painful sensation was less than on the former

application, lasted a shorter time, and in an hour after the armed bougie was withdrawn, he made water freely for the first time since the commencement of his indisposition. He said the irritation in the bladder was removed, and he felt very well. His appetite returned, he slept very well, and continued to void his urine with ease.

"In this state, nothing was done till the fifth day, leaving always a day between the applications of the caustic.

"On this day a common-sized bougie went readily into the bladder; it was immediately withdrawn, and the cure was considered as complete; no bougie was afterwards passed, lest it might bring back an irritation upon the passage. I met this gentleman twelve months after, and he assured me, he had continued perfectly well, and I have since learned, that, in three years, there has been no return.

"From the result of this case, I was encouraged to hope that the caustic might be applied to strictures in the urethra with more confidence, than I had hitherto believed, since it evidently did not bring on, or increase the general irritation, but, on the contrary, seemed to allay it."

The foregoing case, together with another one, which Mr. Home has related in his book on the present subject, convinced this gentleman, that he had discovered an effectual mode of treating such strictures, as do not admit of being relieved by the common bougie. Hence, he adopted the use of armed bougies, as a general practice; but, he has not concealed the circumstances, under which the method has not proved successful. Mr. Home informs us that "In some constitutions, where the patients have resided long in warm climates, every time the caustic is applied to a stricture, a regular paroxysm of fever, called by the patient an ague, takes place; and this has been so violent as to render it impossible to pursue this mode of practice. Of this I have met with two instances. I consider this disposition to fever, as the effect of climate, and not of any natural peculiarity of constitution; for the brother of one of these patients laboured under the same disease, but as he had not been in warm climates, it was removed by the caustic without his experiencing such attacks.

In *gouty* constitutions, attacks of the gout have in two instances brought on spasmodic constrictions, after the stricture had been removed by caustic. This, however, cannot be called a failure of the caustic. It only shews, that gout can affect strictures, and re-produce them.

"In some patients, the strictures are so obdurate, that the use of the caustic is necessary to be continued for a longer time, than the parts can bear its application, or even that of the bougie passing along the urethra; irritation therefore comes on and stops the progress of the cure, and when the same means are resorted to again, the same thing takes place. The cases of failure of this kind that I have met with, some of which may yet ultimately be cured, if the patients will take the necessary steps for that purpose, amount in all to six.

"In some patients, the stricture is readily removed by the caustic, but, in a few weeks, contracts again. The stricture being wholly spasmodic, the caustic, by taking off the spasm, is allowed to pass through, and cannot completely destroy the stricture. Of this kind, I have met with one instance, which I must consider as a failure, as I have hitherto been unable to get the better of it.

"In those cases, where the caustic gradually removes the stricture, and brings the urethra to a size, that allows the patient to make water perfectly well, if there is any return, it is not to be attributed to the failure of the caustic, but to the want of proper management, either from the caustic being too small, or its use left off too soon; but, all such cases are, I believe, within the power of being cured by the caustic, if its use is recurred to when that is found necessary."

For the generality of strictures in the urethra, which certainly do not occupy more extent of the canal, than if caused by a piece of packthread being tied round it, the bougies, armed with the lunar caustic, should be preferred. But, there are instances, in which the urethra is diminished in diameter, for an inch or more: in these cases, I cannot help considering the employment of common bougies most advantageous, that is to say, when they can be introduced through the stricture, so as to cure it on the principle of dilatation.

We shall conclude this part of the subject of strictures, with inserting some of the general directions given by Mr. Home how to arm the bougie, and apply the lunar caustic to strictures.

In arming a bougie, it will be difficult to get a piece of caustic of a proper shape and size for the purpose, unless it be cast in a small cylindrical mould. "In this state (says Mr. Home) it is to be procured from Mr. Savigny, instrument-maker, in King-street, Covent-Garden; and, if these pieces are thicker, than the bougie can readily enclose, by putting them in water, the outside quickly dissolves, so as to diminish their size, as much as is required.

The piece of caustic, so prepared, is to be cut into small portions, about a quarter of an inch in length, and an orifice being made in the end of a bougie, the caustic is to be inserted into it, and the bougie rolled, so as to be made perfectly smooth, taking care, that the sides of the caustic are every where covered, and only the end exposed.

"This (continues Mr. Home) was the mode, in which I armed bougies, when I first took up this practice; but, it happened, that, in two or three instances, the caustic was left in the urethra; that canal, when in a very irritable state, grasped the bougie, and pulled the caustic out; I was therefore led to consider how such an accident might be prevented, and applied to the makers of bougies for that purpose. Mr. Pass, the late beadle of the Surgeons' Company, who dealt in bougies, discovered a very ingenious and effectual mode of securing the caustic. In forming the bougie, a piece of wire, the size of the caustic, is rolled up along with it, passing into the substance for half an inch; when the bougie is nearly finished, the wire is withdrawn, and the caustic inserted in its place; after this, the bougie is rolled again, so that the sides of the caustic become firmly cemented to the linen, by means of the composition of the bougie, and when cold, cannot be separated by any force. In this way bougies are now generally armed.

"After the bougie has been thus prepared, the distance of the stricture from the external orifice is to be measured, and the canal cleared by passing a common bougie, fully as large as that which is armed. The armed bougie, with the distance marked upon it, is then to be introduced, and applied to the stricture; when it is brought in contact with the obstruction, it is to be steadily retained there, with a moderate degree of pressure at first, and less as it is longer continued, since the bougie becomes soft by remaining in the urethra, and readily bends, if the pressure is too great. The time it is to remain depends a good deal upon the sensations of the patient, and the length of time the parts have been diseased; but on the first trial, it should be less than a minute, as it then commonly gives greater pain than on any subsequent application. The pain produced by the caustic is not felt so immediately as it would be natural to expect; the first sensation arises from the pressure of the bougie on the stricture; a little after, there is the feeling of heat in the parts; and lastly, that of pain.

"As soon as the caustic begins to act, the surgeon, who makes the application, is made sensible of it by the smaller arteries of the parts beating with unusual violence, which is very distinctly felt by the finger and thumb, that grasp the penis.

"The pain that is brought on by the caustic, lasts for some time after it is withdrawn; but this period differs in almost every patient, being sometimes extended to half an hour, and sometimes only a few minutes.

"The kind of pain is heat and soreness, which is not severe, not being accompanied by the peculiar irritation, upon so many occasions experienced by patients who have strictures; an irritation that cannot be described, which is most insupportable, and is too often brought on by dilating strictures with the bougie. After the caustic has been withdrawn, it is desirable, that the patient should make water before he uses exercise, as the parts are commonly more tranquil after having done so; but sometimes no water will flow at the first effort. When that is the case, it should not be urged, as it is not of any material consequence. It happens not unfrequently, that at the first time of making water, some blood passes along with it. This is rather favourable; as, when the parts bleed, the stricture usually proves to be so far destroyed, that at the next trial the bougie passes through it. Every other day, appears in general to be as often as it is prudent to apply the caustic. I have, however, done it every day, in very obstinate cases, where the parts are less sensible, without any detriment.

"The bougie, which is passed down to prepare the way for the caustic, and measure the distance for the armed bougie, must be made of soft materials, that it may readily receive an impression from the part against which it is pressed, and its colour should be light, so as to admit of those impressions being more distinctly seen. With the assistance of such bougies, I am able to discover the size and shape of the orifice of the stricture; to ascertain with accuracy the progress of the caustic upon it; to see whether it is on one side of the canal, or equally all round; and to apply the caustic accordingly.

"When the soft bougie passes through the stricture, by leaving it in the canal a few minutes, it can be known whether the stricture is completely destroyed or only relaxed; in the last case, there is an impression on the side of the bougie.

"So necessary is the information, which is acquired in this way, to enable the surgeon to prosecute the cure of stricture by means of the caustic, that without it I should have been unable to pursue this mode of practice. I should have wanted

a sufficient degree of confidence to carry me on, which nothing but an accurate knowledge of what had been already done, could have given, and, in no other way, is that to be acquired." (*Home on Strictures.*)

CURE OF STRICTURES BY THE KALI PURUM.

Mr. Whately, in his publication on strictures, has endeavoured to shew, that they are not merely contracted fibres of the urethra, but really diseased portions of the membrane lining that canal, with a continued disposition to increased contraction. Hence, this gentleman seems to conceive, that the application of a remedy, calculated both to remove the diseased affection, and to dilate the contracted part, might perfectly cure the complaint, without putting the patient to the inconvenience of wearing a bougie. Mr. Whately affirms, that such a remedy is caustic, when judiciously used. Hitherto the lunar caustic has been chiefly employed; but, this gentleman states, that it has been his good fortune to discover a more efficacious, and, at the same time, a less painful and hazardous remedy for the disease in question. The kali purum is the application alluded to, which Mr. Whately says, if used in the manner, and with the precautions about to be described, will be found to possess singular efficacy in curing the complaint. He avows, that he has already had so much experience of it, and that he is so perfectly convinced of its superiority over the lunar caustic, as well as over the common bougie, that he now uses it in a considerable number of the cases, which come under his care. Of its safety he is also as well convinced, as of its efficacy; for, if used with circumspection, experience shews, that there is little danger of its producing any disagreeable effect.

However, if the kali purum be applied while the parts are in a highly inflamed, or irritable state, or (as Mr. Whately adds) tending to gangrene; if the habit be bad, and the patient very far advanced in years; we may expect the most mischievous effects from the application; and this practitioner censures the use of any kind of caustic under such circumstances, for strictures in the urethra, as dangerous in the extreme.

Mr. Whately represents, that if the patient be affected with fever, or any other acute disease; if he be much indisposed from any cause; if, in particular, he have a gonorrhœa, attended with much inflammation and irritation in the urethra; if the prepuce, glans, or any other part of the penis, or the parts adjoining to it, be swelled and inflamed; if the urethra, and especially, the strictured part of it, be so irritable, as not to bear the touch of a bougie; the use of the caustic is for the present forbidden. Mr. Whately also enjoins great caution in applying this remedy to persons advanced in years. Even when no objections of the above kind exist, the caustic should not be resorted to in the first instance. Mr. Whately maintains, that in every case of stricture, before venturing to employ the caustic, we ought to be able to pass into the bladder a bougie, of at least a size larger, than one of the finest sort. This is necessary, both to enable us to apply the caustic to the whole surface of the stricture, and to relieve a retention of urine, should it occur during the use of the caustic.

When a bougie of the preceding description can be introduced, without occasioning pain, faintness, or great dejection of spirits, the use of caustic may commence immediately, when none of the above described objections exist.

When the urethra is very irritable, Mr. Whately recommends a common bougie to be introduced every day, and kept in the urethra; at first, for a few minutes only; but, by degrees, for a longer time; till the irritability of the parts has been sufficiently lessened.

When the urethra is rendered so impervious by a stricture, that a small bougie cannot be passed into the bladder, which viscus is also in a painful inflamed state, Mr. Whately asserts, that caustic, in any form, or quantity, must not be immediately employed; but, that the stricture should be first rendered capable of allowing a bougie a little larger, than one of the finest size, to be introduced into the bladder. When this is done, the urine is more freely evacuated, and the consequent irritation and inflammation of the bladder lessened, if not removed, together with the danger of a retention of urine. Caustic may then be advantageously conveyed into the centre of the stricture.

Mr. Whately considers the practice of at once thrusting down, in this sort of case, an armed bougie, considerably larger than the narrowest part of the contracted canal, as most dangerous, and horridly painful. For, says this gentleman, it frequently happens, that nearly the whole of the urethra anterior to the bulb, is so much contracted by numerous and uncommonly rigid strictures, that, it is impossible, by any art whatever, to dilate the passage to its natural size. If, therefore, the canal, whilst, in such a state, be rudely torn open by a large caustic bougie, hemorrhage, pain, dangerous suppressions of urine, inflammation, mortification, and death itself, must sometimes inevitably ensue,—even before the caustic

can be applied to the principal seat of the disease. In cases, like the one just mentioned, the first step, preparatory to the use of the caustic, should be, according to Mr. Whately, to dilate the strictured part of the urethra; for which purpose, he advises the slow and gentle introduction of a fine bougie, with its point inclined to the lower side of the canal, in order to avoid the large lacunæ, situated on its upper part. When the surgeon, by steady perseverance and dexterity, has succeeded in getting a fine bougie through the worst stricture into the bladder, the instrument should be worn, for a few hours, every day, till the passage is sufficiently dilated to admit a larger one.

Mr. Whately, after explaining, that the kali purum ought not to be applied to strictures of the urethra, till a bougie of a proper size can be passed into the bladder; after having pointed out the methods to be taken, before applying this caustic; and enumerated certain cases and circumstances, in which its employment is interdicted; next proceeds to describe the mode of practice, which it is the particular object of his book to recommend.

For the purpose of arming a bougie, Mr. Whately advises us to put a small quantity of kali purum upon a piece of strong paper, and to break the bit of caustic with a hammer into small pieces of about the size of large and small pins' heads. In doing this, care should be taken not to reduce it to powder. Thus broken, it should be kept for use in a phial, closed with a ground stopper. The bougie should have a proper degree of curvature given to it, by drawing it several times between the finger and thumb of the left hand.

Mr. Whately next acquaints us, that before the caustic is inserted into the bougie, it is necessary to ascertain the exact distance of the stricture, (to which the caustic is to be applied) from the extremity of the penis. For this purpose, the bougie, which should be just large enough to enter the stricture with some degree of tightness, ought to be gently introduced into the urethra; and when its point stops at the stricture, which it almost always does, before it will enter it, a notch is to be made with the finger-nail, on the upper or curved portion of the bougie, on the outside of the urethra, exactly half an inch from the extremity of the penis. When the bougie is withdrawn, a small hole, about the sixteenth part of an inch deep, should be made at the extremity of its rounded end. A large blanket-pin two inches and a half in length, with the head struck off, will answer the purpose; the hole being made with the point of the pin. The extremity of the bougie should then be made perfectly smooth with the finger and thumb, taking care, that, in doing this, the hole in its centre be not closed. Some of the broken caustic should then be put on a piece of writing paper, and a piece less in size, than the smallest pins' head, should be selected; the particle, indeed, says Mr. Whately, cannot be too small for the first application. Let this be inserted into the hole of the bougie with a pocket-knife, spatula, or some such instrument; and pushed down into it with the blunt end of the pin, so as to make the caustic sink a very little below the margin of the hole. To prevent the kali from coming out, the hole should then be contracted a little with the finger, and the remaining vacancy in it is to be filled with hog's lard. This last substance (continues Mr. Whately) will prevent the caustic from acting on the sound part of the urethra, as the bougie passes to the stricture. When the bougie is quite prepared, let it be first oiled, and immediately afterwards introduced, by a very gentle motion, with the curvature upwards, as far as the anterior part of the stricture, upon which the caustic is to be applied. In doing this, the end of the bougie, that is held by the finger and thumb, should be a good deal inclined towards the abdomen, on the first introduction of the instrument, in order to preserve its curvature. After it has passed about five inches, this end should be gradually brought downwards, as the bougie passes on, till it forms a right angle with the body. The bougie is known to have arrived at the stricture by the resistance made to its progress.

As soon as the bougie has reached the anterior part of the stricture, it should rest there for a few seconds, that the caustic may begin to dissolve. It should then be pushed very gently forward, about one-eighth of an inch; after which, there should be another pause, for a second, or two. The bougie should then be carried forward in the same gentle manner, till it has got through the stricture. The sense of feeling will generally inform the operator when the point of the bougie has proceeded so far; but, the notch in the bougie is to be an additional guide, by becoming very near the orifice of the urethra, when the end of the instrument has just got through the stricture.

The bougie should now be immediately withdrawn by a very gentle motion to the part, at which it was first made to rest awhile. Then it should be very slowly passed through the stricture a second time; but, without letting the bougie stop in its passage. If the patient complain of pain, or be faint, the bougie should be immediately withdrawn; but, if these effects are not produced, we may repeat

the operation of passing and withdrawing the bougie through the stricture once or twice more, before we finish the operation, which will take up, in the whole, about two minutes.

The first application of the kali purum, in this manner, gives, according to Mr. Whately's account, a very little pain. A slight scalding in making water, and a trifling discharge, during the first day or two, however, are commonly produced.

At the end of seven days, the application of the caustic is to be repeated in the same manner. When the first application has enlarged the aperture of the stricture, which may be known by passing a bougie through it, of the same size as that by which the caustic was conveyed, the bougie used in the second operation, should be a size larger, than the one, used in the first; but it must not be too large to pass through the stricture. If the patient had no pain on the first application, the bit of kali purum may also be trivially larger. At the end of seven days more, the armed bougie should be introduced a third time. At this, and all future applications, the bougie should be increased in size, in proportion as the aperture in the stricture becomes dilated. The quantity of caustic, however, is never to be increased in a ratio to the size of the bougie. In no cases whatever, does Mr. Whately apply more of the kali purum at a time, than a piece about the size of a common pin's head. Twelve bits of the largest size, which this gentleman ever uses, weigh one grain.

When there are several strictures, the kali purum should be generally applied to only one at a time.

An interval of seven days is what Mr. Whately generally allows to elapse between the applications of the caustic. The rule, however, may now and then be deviated from; but, the kali purum ought never to be re-applied, till the action of the last application has completely ceased. In a few instances, the interval may only be five days; in some others, it may be eight, nine, or even a longer space.

In the above method of using the kali purum, Mr. Whately represents, that this substance is equally diffused over every part of the strictured surface, and only *abrades* the membrane of the stricture, without producing a slough. The *degree* of this abrasion, he says, may be increased, or lessened, as circumstances dictate, by paying attention to the quantity of the caustic.

The foregoing account will suffice for conveying an adequate idea of Mr. Whately's method. I am sorry I cannot add my favourable opinion of the practice. To *abrade*, without destroying, is to me perfectly unintelligible. Nor can I conceive, that a liquid caustic (for so it is represented as becoming) can be applied with the accuracy to strictures, which Mr. Whately seems to suppose happens. The generality of strictures are also like such mere contractions, which one may suppose would be produced by tying a piece of packthread round the urethra. For these, the lunar caustic bougies seem best; and, when the stricture occupies some extent of the passage, common bougies are the most eligible.

The works, which contain the chief information on the subject, which we have just been treating of, are: *A Treatise on the Venereal Disease, by John Hunter. Practical Observations on the Treatment of Strictures in the Urethra and Œsophagus, by Everard Home, in 2 vols. An improved Method of treating Strictures in the Urethra, by Thomas Whately, Edit.* 2, 1806.

URETHRA, FALSE PASSAGE IN. One of the worst consequences of using catheters, and bougies, in an improper manner, is the rupture of the urethra, or the formation of a false passage by ulceration. With bougies, this accident is generally occasioned by trials to excite ulceration by the application of the end of the bougie to the stricture, when this instrument cannot be passed through it. When once the new passage has formed, whenever the bougie is introduced, it cannot be hindered from going into the false track, and its action on the stricture is altogether frustrated.

Mr. Hunter has advised the following operation to be practised in this kind of case. Pass a staff, or any such instrument into the urethra, as far as it will go, which will probably be to the bottom of the new passage, and this, we may be certain, is beyond the stricture. Feel for the end of the instrument externally, and cut upon it, making the wound about an inch long, if the disease be before the scrotum; and an inch and a half, or more, if in the perineum. If the new passage be between the urethra and body of the penis, you will most probably get into the sound urethra, before you come to the instrument, or new passage. If so, introduce a probe into the urethra, through the wound, and pass it towards the glans penis, or, in other words, towards the stricture. When it meets with an obstruction, this must be the stricture, which is now to be got through, and afterwards dilated. To complete the operation, withdraw the probe, and, instead of it, introduce a hollow cannula forwards to the stricture. Then introduce another cannula from the glans downward, till the two tubes are opposite each other, having the stricture between them. An assistant is now to take hold of the urethra on the outside, with his finger and thumb, just

where the two cannulæ meet, in order to keep them in their places. Through the upper cannula next introduce a piercing instrument, which is to perforate the stricture, and enter the lower cannula. The piercing instrument is now to be withdrawn, and a bougie introduced through the first cannula and stricture, into the second cannula. The tubes are to be withdrawn, and the end of the bougie, in the wound, directed into the bladder, through the further portion of the urethra. It may also be necessary to lay the whole of the false passage open, in order to make it heal; for otherwise, it might still obstruct the future passage of bougies into the proper canal.

When the new passage is between the skin and urethra, the surgeon must extend his incision more deeply, for the purpose of finding out the natural passage. Then he is to proceed as above explained.

The longer the first bougie is allowed to remain in the canal, the more readily will the second pass. The bougies must be gradually increased in size, and used till the wound is healed. The only improvement, which seems proper to be made in this plan, is to employ hollow bougies, or flexible gum catheter, which might be worn longer than common bougies, as the patient could void his urine through them. (See *Hunter on the Venereal Disease.*)

URINARY ABSCESSES. Extravasations of urine may be in three different states. This may be collected in a particular pouch; it may be widely diffused in the cellular membrane; or, lastly, it may present itself in a purulent form, after having excited inflammation and suppuration in the parts, where it is situated. This case is termed by the French writers an urinary abscess.

Such extravasations of urine always imply a rupture in some of the excretory passages for this fluid, either in the kidnies, or ureters, the bladder, or the urethra. This solution of continuity may be produced by a variety of causes. It is most frequently the effect of a forcible distention of these passages, in consequence of a retention of urine. Phlegmonous abscesses, formed in the thickness of the parietes of these passages, or along their course, may also occasion this rupture, by bursting internally. The solution of continuity may also be produced by a sword, or another foreign body that has penetrated the parts. There are likewise examples of effusions of urine depending upon the displacement of the cannula of the trocar, after the operation of puncturing the bladder. Several have been noticed, (and, indeed, they are very frequent) caused by false passages in the urethra; and we have cases of similar effusions, following violent contusions of the perineum, attended with laceration of the urethra.

It is further observed, in Les Œuvres Chirurgicales de Desault par Bichat, Tom. 3, that the ravages, which the urine makes, when out of its natural receptacles, are usually greater, and more extensive, when this fluid is extravasated in the cellular membrane, than when it is effused into a particular pouch. The mischief is also less, when the excretory passage is free, than when it is closed by any obstacle, as in cases of retention. The more or less loose texture of the parts, in which such effusions happen, likewise makes a considerable difference in their progress and formation. With regard to the place, which they occupy, it is ordinarily determined by the situation of the rupture, by which the urine has escaped. When the pelvis, or infundibulum of the kidney, or the upper part of the ureter, gives way, the urine is commonly effused in the loins and the fossæ iliacæ, between the peritoneum and the adjacent parts. When the lower part of the ureter, or the bladder, near its lower portion, gives way, the extravasation is generally included within the pelvis.

But, when the rupture occurs in the anterior parietes of the bladder, near its upper part, and, especially, when it takes place at a time, when this organ is extremely distended and dilated, the urine becomes effused behind and above the pubes, sometimes ascends to the epigastric region, between the peritoneum and the abdominal muscles, and, after having followed the course of the spermatic vessels, it often makes its exit at the ring, and is extravasated in the groins and scrotum. If the rupture has happened in the urethra, the most common situation of the effusion is in the perineum and scrotum. The extravasation frequently extends to the penis and upper part of the thighs, and even sometimes propagates itself, under the skin of the abdomen, up to the hypochondria and sides of the chest. Such is the ordinary course of the urine, when extravasated out of the parts, which are destined to contain it; but, the slightest circumstance may alter this course, and produce sinuses in several other parts of the body.

In the animal economy, there is no fluid, the extravasation of which is so fatal, as that of the urine. If it is not promptly discharged, it soon excites a putrid suppuration in the cellular membrane, which contains it, makes this part slough, causes a gangrenous inflammation of the skin, and almost always produces a mortification of the parts, amongst which it flows.

While the extravasation of urine is con-

fined to the interior of the pelvis, and lumbar and iliac regions, without manifesting itself externally, there is no certain sign of its existence. The circumstances, which may be recollected, however, joined with the symptoms, which the patient complains of, may lead to a suspicion of the extravasation. Thus, when in consequence of a retention of urine in the ureters, or bladder, the patient has suddenly experienced great relief, without any of the urine having been discharged the natural way; when he has at the same instant felt a kind of pricking in the loins, or pelvis; when to the ease, which lasted only a few hours, symptoms, more severe than the former ones, have succeeded, such as ardent fever, hiccough, vomiting, &c. there is reason for believing, that an internal extravasation has happened. The uncertainty in the diagnosis is here not much to be lamented, since art can do nothing for this kind of disorder, and, if there were the clearest proofs of its existence, we should be equally compelled to abandon the patient to the resources of nature, whose efforts are almost always ineffectual.

This uncertainty in the diagnosis disappears as soon as the extravasation becomes apparent externally. The case is then announced by symptoms, which hardly ever deceive. The preceding retention of urine; the sudden appearance of the swelling caused by this fluid; the rapid progress of this tumour; the kind of crepitation perceptible in it, like that which occurs in emphysema; the tension of the œdematous shining skin, as in leucophlegmasia; the diminution of the symptoms depending upon the retention; such are the first occurrences, which are observable, when the extravasation is somewhat considerable.

If the patient is not speedily assisted, and the urine continues to be extravasated, the tumour spreads more and more; the skin assumes a red violet colour; gangrenous eschars are formed, the separation of which gives issue to a very fetid sanies, in which the smell of urine is readily distinguishable. Portions of dead cellular membrane are presently discharged together with the sanies; the ulcer grows larger; and the dressings are continually wet with the urine.

The indications to be fulfilled are not the same in all cases of extravasations of the urine; they vary according to the situation of the breach of continuity in the urinary passages, and the particular situation and extent of the effusion. When the rupture has happened in the ureters, and an urinary abscess is formed in the loins, the aid to be derived from surgery is limited to making an opening in the extravasation, as soon as it can be felt externally. It is then not in the power of art to re-establish the natural course of the urine, or to hinder this fluid from passing through the wound, so as to render it fistulous. However, there are some circumstances, in which a radical cure may be effectually attempted. For example, if the abscess were produced by a calculus lodged in the infundibulum, or ureter, and it could be felt, and taken hold of with a pair of forceps, introduced into the opening, the extraction of the foreign body might promote the healing of the ulcer, by rendering the natural channel for the urine free.

When the opening, by which the urine has become extravasated, exists in the bladder, or urethra, one indication, that does not present itself in the foregoing case, may be fulfilled, viz. the urine may be drawn off by means of a catheter passed into the bladder, and kept there. By this means, we not only immediately stop the progress of the extravasation, but attack the very cause of the malady, by removing the obstacles, which oppose the natural course of the urine. The introduction of the catheter then is here a matter of the most urgent necessity. This operation is often attended with the greatest difficulties. Besides the ordinary obstruction of the canal, we have also to surmount the obstacles, which the urinary swellings situated in the course of the urethra, create to the passage of the instrument. When these tumours are considerable, they ought to be opened before the catheter is employed. The subsidence of the swellings would render catheterism more easy. Besides, Bichat and Desault were assured by daily experience, that with a little skill, exercise, and patience, the catheter may always be got into the bladder. If, however, the thing could not be done, ought we to puncture the bladder, or have recourse to the operation termed by the French boutonnière?

Desault was an advocate for neither of these proceedings: he thought it was a more simple and beneficial practice merely to make an external opening in the collection of effused urine. This measure would both afford an outlet for the urine, and arrest the extension of the extravasation. Besides such an opening is often indispensably requisite for the purpose of putting a stop to the symptoms depending upon the effusion and stagnation of the urine. But, if the catheter can be introduced, there may be cases, in which an opening would not only be useless, but hurtful; for instance, when the swelling, caused by the urine, is of little extent, or when it is situated in the thickness of the parietes of the passage, or along its track, it almost always admits of dispersion by the simple employment of the catheter.

It seldom happens, however, that this swelling, however small, ends in resolution; it almost always suppurates; but, as it breaks into the urethra, the matter escapes between this canal and the catheter, and renders the making of an external opening needless. Experience teaches us, also, that when the tumour is situated in the scrotum, or between the root of the penis and the symphysis pubis, even after the healing of incisions, made in these situations, a fistula will often remain, which is very difficult of cure. With the exception of these particular cases, Desault was an advocate for opening all urinary abscesses.

The manner of opening such collections varies according as the urine may be in one cavity, or widely effused in the cellular membrane. In the first case, a simple incision, the whole length of the cavity, will suffice for emptying and healing it. In the second, if the extravasation is extensive, the incisions must be multiplied. It would be absurd to spare the parts; for, all those, with which the urine has come into contact, seldom escape mortification. The incisions, which are made, hardly ever have the effect of saving them; but, by accelerating the discharge of putrid sanies and stagnant urine, they prevent the mischief, which would originate from their further lodgment. If these incisions, however, were practised a few hours after the extravasation, and before suppuration, the parts might be completely freed from urine and preserved. When the operation is at all delayed, their destruction is inevitable. The approach of mortification is indicated by the crepitation under the bistoury, resembling the kind of noise produced by tearing parchment. The extent and depth of the incisions must be proportioned to those of the abscess. When the extravasation occupies the scrotum, long deep scarifications should be made in that part, as well as in the skin of the penis, and in every place, where the urine is effused.

Practitioners, unaccustomed to see such diseases, would be alarmed at the extent of the sore produced by the separation of the eschars. Sometimes, the whole scrotum, skin of the penis, and that of the groins, perinæum, and upper part of the thigh, mortify, and the naked testicles hang by the spermatic cords, in the midst of this enormous ulcer. It is hardly conceivable how cicatrization could take place over the exposed testicles; but, the resources of nature are unlimited. She unites the testicles and the cords to the subjacent parts, and drawing the skin from the circumference to the centre of the ulcer, she covers these organs again, and furnishes them with a sort of new scrotum. This statement is founded upon numerous cases, in which nature always followed this course. The cicatrization of the ulcer is even more expeditious, than might be expected, considering its extent. In all this business, what does art do? If the introduction of the catheter is excepted, which, indeed, is absolutely necessary for the radical cure, her assistance is very limited, and almost nothing, in the generality of instances; for when the patients are not exhausted by the tediousness of the disorder, when they are of a good constitution, and in the prime of life, they get well as quickly and certainly, with the aid of a good diet and simple dressings, as when they take internal medicines, and use a multiplicity of compound topical applications. The practice of Desault at the Hôtel-Dieu consisted in applying emollient poultices, until the sloughs were detached. The ulcer was then sometimes dressed with pledgets charged with styrax; but frequently mere dry lint was used, and continued till the cure was completed. If any complication occurred in the course of the treatment, suitable remedies were prescribed for it. Thus when prostration of strength, and tendency to sloughing existed, bark, cordials, and antiseptics were ordered. But, in every case, the catheter is the essential means of cure; without it, the treatment is almost always imperfect, and the ulcer will not heal, without leaving several urinary fistulæ. (See *Œuvres Chirurgicales de Desault par Bichat, Tom.* 3, *p.* 277—287.)

URINARY CALCULI. Dr. Wollaston has divided urinary calculi into four species. 1st. The uric acid concretion. 2d. The fusible calculus, or phosphate of ammonia and magnesia. 3d. The mulberry calculus, or that consisting of oxalate and phosphate of lime. 4th. The bone-earth calculus, or that composed of the phosphate of lime.

As the symptoms of a stone in the bladder are detailed in another part of this Dictionary, it will only be necessary in the present place to refer the reader, for information upon that subject, to the article, *Lithotomy*.

The stone being a most severe affliction, and the operation extremely hazardous and painful, a variety of experiments have been instituted, for the purpose of discovering a solvent for urinary calculi. Hitherto, however, all the remedies and plans, which have been tried, have been attended with very limited, and, by no means, equivocal success, notwithstanding many persons may have been deceived into a contrary opinion.

The dissolution of stones in the bladder, has been attempted by lithontriptic medicines, as they have been termed, and by fluids injected into this viscus.

From the experiments of Fourcroy, it appears, that almost every ingredient in calculi is dissolved by the caustic alkali; and various experiments have shewn, that the whole calculus yields to its powers. Limewater has also been found a solvent of urinary calculi out of the body. It is obvious, however, that what is taken by the mouth is subject to many changes in the alimentary canal, and also the lymphatic, and vascular systems, and that, in this way, it must be exceedingly difficult to get such substances, (even were they not liable to alterations) in sufficient quantity into the bladder. Indeed, there are very few well authenticated facts of the urine being so changed, as to become a menstruum for the stone. Excepting the case of Dr. Newcombe, recorded by Dr. Whytt, the instance of Mr. Home is almost the only one. Though lithontriptic remedies, however, may not in general actually dissolve the stone in the living bladder, yet it is an incontrovertible fact, that they frequently mitigate the paroxyms of pain; and, to lessen such torture, as that of the stone in the bladder, is surely an object of no little importance.

Lime was long ago known as a solvent of urinary calculi, and different methods were employed to administer it with safety. One of these plans fell into the hands of a Mrs. Steevens, and her success caused great anxiety for the discovery of the secret. At last, Parliament bought the mystery for £5000. In many instances, stones which had been unquestionably felt, were no longer to be discovered; and, as the *same* persons were examined by surgeons of the greatest skill and eminence, both before, and after, the exhibition of the medicines, it is no wonder, that the conclusion was drawn, that the stones had been really dissolved. From the cessation of such success, and from its now being known, that the stones are occasionally protruded, between the fasciculi of the muscular fibres of the bladder, so as to become lodged in a kind of cyst, on the outside of the muscular coat, and cause no longer any grievances, surgeons of the present day, however, are inclined to suspect, that this must have happened in Mrs. Steevens's cases. This was certainly what happened to one of the persons, on whom the above medicine was tried, as Dr. W. Hunter informs us. It is evident, that a stone, so situated, would not only produce no particular irritation, but would also be quite indiscoverable by the sound; for, in fact, it is no longer in the cavity of the bladder.

Mrs. Steevens first gave calcined eggshells alone; but, finding costiveness produced, she added soap. In time, she rendered her process more complicated, adding snails burnt to blackness, a decoction of camomile flowers, parsley, sweet fennel, and the greater burdock.

As soap was with reason supposed to increase the virtues of the lime, it led to the use of the caustic alkali, taken in a mucilage of veal broth. Take of kali prepared, ℥viij; of quick-lime ℥iv; of distilled water ℔ij. Mix them well together in a large bottle, and let them stand for 24 hours. Then pour off the lye, filter it through paper, and keep it in well stopped phials for use. Of this the dose is from 30 drops to ℥ij, which is to be repeated, two, or three times a day. Mix the quantity to be used in the day, with three pints of plain broth, made of the lean part of veal, all the fat, or oily parts being separated from the liquor, by skimming them off when cold. Let the patient drink, within an hour, a pint of this broth three times a day; early in the morning, at noon, and in the evening. Continue this plan, for three or four months, living, during this course, on such things as least counteract the effect of the medicine. The common fixed alkali, or carbonated alkali, and the acidulous soda water, have of late been used as lithontriptics. Honey has also been given, and Mr. Home, surgeon at the Savoy, has recorded its utility in his own, and his father's cases. Bitters have likewise been tried.

Dismissing all theories, limewater, soap, acidulous soda water, caustic alkali, and bitters, are useful in cases of stone. Of the soap, as much may be taken as the stomach will bear, or as much as will prove gently laxative; but, of the limewater few can take more, than a pint daily.

The acidulous soda water may be taken in larger quantities, as it is more agreeable. The acidulous salt is now prepared, so as to produce this water extemporaneously. It must be swallowed, however, while the salt is dissolving; as the carbonic acid gas escapes with great rapidity.

Medicines, taken into the stomach, having failed to dissolve urinary calculi, solvent injections have been introduced through a catheter directly into the bladder. Fourcroy and Vauquelin ascertained, that a ley of potassa, or soda, not too strong to be swallowed, softens and dissolves small calculi, composed of the uric acid and urate of ammonia, when they are left in the liquid a few days. They have proved, that a beverage, merely acidulated with nitric or muriatic acid, dissolves, with still greater quickness, calculi, formed of the phosphate of lime, and of the ammoniaco-magnesian phosphate. They have made out, that calculi, composed of the oxalate of lime, which

are the most difficult of solution, may be softened, and almost quite dissolved in nitric acid, greatly diluted, provided they are kept in the mixture a sufficient time.

We are then acquainted with liquids, which will dissolve calculi of various compositions; but, much difficulty occurs in employing them effectually in practice. For, although we can easily inject them into the cavity of the bladder, this organ is so extremely tender and irritable, that we cannot bear the contact of any fluid, except that which it is destined by nature to contain, and the action of such liquids upon it, as would be requisite for dissolving a stone in its cavity, would produce sufferings, which no man could endure, and the most dangerous and fatal effects on the bladder itself. Another objection to this practice, also arises from the surgeon never knowing what the exact composition of a calculus is, before this body is extracted, and his consequent inability to determine what solvent ought to be tried. Upon this, however, it is unnecessary to lay much stress, since if the previous more weighty objections were done away, the latter difficulty, might, perhaps, be obviated.

URINARY FISTULÆ. By an urinary fistula, strictly speaking, is implied a deep, narrow ulcer, which leads into some of the urinary passages; but, this name is likewise applied to sinuses, which, without having any communication with these passages, terminate near some point of their course. Thus, in Desault's works (*Tom.* 3, *p.* 287), three kinds of fistulæ, in respect to the urinary passages, are noticed. The first sort is called a *blind external fistula*, because it opens only externally; the second, *blind internal*, because it has only one opening into the urinary passages; the third, is termed *complete*, being attended both with an internal opening into the urinary organs, and one or more external apertures.

Amongst the blind external fistulæ, only such as terminate near the canal of the urethra, are particularly noticed in Desault's works. All fistulæ of this kind are originally owing to an abscess, that has formed in the vicinity of the urethra; and, in the article, *Urinary Abscesses*, it has been explained, that these suppurations frequently originate from disease of that canal. Whatever may be the cause of these fistulæ, however, it is not unusual to find, that, after the pus has made its way towards the scrotum or perineum, and discharged itself outwardly, the ulcer is converted into a sinus, which resists all the efforts of nature to heal it. According to Desault, this kind of fistula may be kept up by a thinning and denudation of the parietes of the urethra; a very common disposition, when the abscess is situated about the root of the penis, and towards that part of the canal, which is situated over the scrotum, in consequence of the weight of this latter organ tending incessantly to separate it from the urethra. The opening of the fistula being too small; its orifice higher than its bottom; and its track being narrow and tortuous; may likewise occasion sinuses, and render the sore difficult to cure, by opposing the free exit of the matter. It may also be complicated with hardness and callosities, caries of the bones of the pelvis, disease of the tendons of the muscles of the perineum, &c. It is known, that these different complications operate as so many obstacles to the cure of sinuses. It is easy to distinguish these kinds of fistulæ from such as terminate near the rectum. Besides the symptoms which may be remembered to have occurred, and which are sufficient to point out the difference; a hardness, resembling a cord, that appears to run towards the urethra, may be felt when the finger is passed along the fistulous track. A probe, introduced into the fistula, follows the direction of this cord, and is at last stopped by the parietes of the urethra. It may also be ascertained, that the sinus has no communication with the urethra, by the following considerations: 1. No urine has escaped from the fistula, nor any purulent matter from the urethra. 2. A probe, when introduced into the sinus, cannot be made to touch a catheter passed into the urethra. These symptoms, however, are not infallible; for, in complete fistulæ, it sometimes happens, when the internal opening is small, and there is no obstruction in the urethra, that the whole of the urine is discharged through this canal. Frequently, also, the probe is stopped in the tortuosities of the fistulous track, and, when pushed against the parietes of the urethra, it does not always penetrate the internal opening, especially when this is small, and it is situated in some point of the denuded portion of the canal, that does not correspond to the direction of the fistula. The issue of a larger quantity of pus, on slight pressure being made along the canal leaves no doubt of the existence of sinuses. With respect to other complications, such as callosities, caries of the bones, &c. they may be readily ascertained by their proper symptoms.

The indications to be fulfilled in the treatment of these fistulæ, depend upon a knowledge of the different complications. When the sinuses are kept up by a separation of the scrotum from the parietes of the urethra, Desault recommends exact compression to be made over the part, which method, he says, is sometimes sufficient to accomplish a cure. When this

plan fails, he states, that the healing of the sinus may be promoted by practising an incision on one side of the scrotum, and carrying it as far as the denuded portion of the urethra. When sinuses exist, and they depend upon the smallness of the opening, or its unfavourable situation for the discharge of the matter, the aperture should be enlarged by making an incision into the main collection of pus. When there are callosities, which resist cataplasms, and the most active resolvents, Desault advises us to introduce into the fistulæ, trochees of minium for the purpose of destroying the indurated parts. When the bones are carious, and the tendons diseased, exfoliation must be awaited; and, in every instance the treatment should vary, according to the cause, upon which the fistula depends.

Incomplete internal urinary fistulæ, or, in other words, blind internal fistulæ, are seldom met with in the ureters and bladder. The quality of the cellular substance, which surrounds these parts, favours the effusion of the urine too much for the disorder, arising from a breach of continuity in them to be confined to a simple internal fistula. Such fistulæ, however, are often met with in the urethra. The bursting of an abscess into this canal; the rupture of the same canal in consequence of a retention of urine; a false passage; the healing of the external part of the wound made in lithotomy, while the internal part is not united; are all so many causes of this disease.

The diagnosis of these fistulæ is deducible from circumstances, which may be recollected; together with a discharge of pus from the urethra, before, and sometimes after the issue of the urine; the pressure of a tumour in the course of the urethra, which tumour increases while the patient is making water, and afterwards disappears by pressure, attended with a fresh discharge from the penis of matter blended with urine. This symptom alone is characteristic; for, an old gonorrhœa, complicated with indurations, may also keep up suppuration of the canal. The existence of pain gives no positive information; and nothing certain can be ascertained by the introduction of the catheter. It is true, the beak of this instrument may become entangled in the fistula; but, its entrance into the bladder may equally be opposed by a variety of other obstacles.

These internal urinary fistulæ cannot be cured, except by preventing the urine from getting into them and lodging there. The catheters employed should neither be too large, nor too small. If too large, they would exactly fill the canal, and the pus and urine, contained in the fistulæ, could not be discharged. If too small, the urine would insinuate itself between them and the sides of the urethra, and enter the fistulæ. Such inconveniences may be avoided by using a catheter of moderate size. Its employment must be continued till the ulcer is entirely healed. The inutility of medicated bougies, and other internal and external remedies, is too manifest to need any comment.

Of all urinary fistulæ, there are none more frequent than those which are termed *complete*. Their origin may be in the ureters, bladder, or urethra. Those which arise in the ureters, sometimes terminate in the colon, and the urine is discharged *per anum* mixed with the feces. But, most commonly, these fistulæ make their appearance externally, either in the lumbar, or inguinal regions. Those which communicate with the bladder, have also different terminations. When they proceed from the upper and interior part of this organ, they ordinarily pierce the parietes of the abdomen above the pubes, and towards the navel. They also sometimes terminate in the groins. When they originate in the posterior parietes of the bladder, they sometimes tend into the cavity of the abdomen, where they almost always prove mortal; and sometimes into the intestines, if there should be adhesions between these and the bladder so as to favour this communication. When the opening in the bladder is near the bottom of this viscus, the fistula sometimes terminates in the rectum of the male, and the vagina of the female subject; but, most frequently, it ends in the perineum, in both sexes. With regard to the fistulæ, which originate in the urethra, they usually open externally in the perinæum, the scrotum, or the penis, and sometimes also in the rectum. It is not uncommon to see the external opening of these fistulæ at a great distance from the internal one, and to find in the middle, and even the lower part of the thighs, the groins, parietes of the abdomen, and as high as the sides of the chest. Often there is only one opening in the urethra, while there are several situated externally more or less distant from one another.

Most of these fistulæ are the consequences of a retention of urine, and are owing to the same causes, as the diseases of which they are a symptom. Those which communicate with the rectum, in the male subject, sometimes depend upon this intestine having been wounded in the operation of lithotomy; and those, which open into the vagina, are often the effect of a violent contusion, caused by the head of the child in difficult labours, or of ulceration produced by pessaries, which are too large, and the margins of which are

too sharp and irregular. Carcinoma of the rectum and vagina also give rise to fistulæ, by extending into the bladder.

The discharge of urine from the external orifice of the fistulæ is an unequivocal proof of its communication with the urinary passages; but this symptom does not always exist, and, it often happens, that, when the fistula is narrow, and there is no obstruction in the urethra, the urine more readily escapes the latter way, than through the fistula. The kind of cord, which is felt in the track of the fistula, and which extends towards the urethra, is a very uncertain criterion of the communication with this canal. This symptom is common to all fistulæ complicated with callosities, whatever may be their nature in other respects. The fungus, which sometimes appears round the external orifice, is also observed in fecal fistulæ. The situation of this outer aperture scarcely affords any presumption on the nature of the fistula, since, in numerous cases, this opening is very distant from the urinary passages. When the fistula is narrow and tortuous, injections will not always pass into the bladder or urethra, but, become extravasated in the cellular substance. It is often difficult, sometimes even impossible, to find out the internal orifice of the fistula with a probe. When it communicates with the rectum, or vaginæ, the opening may sometimes be perceived with the finger, and occasionally, a staff introduced through the urethra, may also be felt in those parts. When the fistula originates in the bladder, the issue of the urine is continual; and when it arises in the urethra, the discharge of this fluid is only made, when the patient has occasion to make water. This distinguishing sign is not constant, and, in Desault's works, mention is made of several cases, in which the urine did not issue from fistulæ communicating with the bladder, except when the patients endeavoured to empty that organ.

Fistulæ of the kidneys, or ureters, are entirely beyond the reach of art, unless they should be kept up by the retention of urine in the bladder, or the presence of a foreign body in the track of the fistula. The re-establishment of the natural course of the urine, and the extraction of the extraneous substance may, in such a case, effectually contribute to the cure. Here, however, we have no certain means of preventing the urine from entering the fistula. This is not the case, with respect to fistulæ of the urethra, where we are, as it were, masters of that fluid. It is particularly in these latter disorders, that elastic gum catheters are attended with inestimable advantages.

When fistulæ of the bladder, or urethra, are the consequences of a retention of urine, produced by obstructions in this last canal, these obstructions often exist still; sometimes they have even increased since the formation of the fistula, which circumstance, in the majority of cases, renders the introduction of the catheter extremely difficult.

It is particularly when fistulæ terminate in the lower part of the bladder, that the utmost care must be taken to prevent the catheter from being stopped up by any foreign body, which would obstruct the urine, as well as to hinder the instrument from becoming displaced, or slipping out of the bladder. Perhaps, in this instance, instead of stopping up the catheter, it would be better to keep it constantly open, in order to prevent all accumulation of urine in the bladder, and the passage of this fluid through the fistula. But, when the fistula communicates with the urethra, no advantage would be derived from keeping the catheter open, and the treatment would be more painful and unpleasant to the patient.

In both cases, Desault recommends us to continue the employment of the catheter, not only until the fistula is cured, but also until the obstacles, which hinder the urine from passing the natural way, are removed. If, besides, there should exist any of the complications, spoken of in treating of blind external fistulæ, the methods there advised are to be pursued; but, in general, the catheter will suffice to effect the cure. Certain fistulæ, however, demand a particular mode of treatment. Such are those, which form communications between the bladder and the rectum, or vagina.

Fistulæ of the bladder, communicating with the vaginæ, and produced by difficult labours, are almost always attended with loss of substance. The forcible contusion occasioned by the child's head on the anterior parietes of the vagina and bottom of the bladder, gives rise to the formation of sloughs, the separation of which sometimes leaves apertures large enough to admit the finger, and hence the cure is exceedingly difficult. In treating such fistulæ, there are two indications to be fulfilled; 1st. to keep the urine from passing into the vagina: 2dly. to keep the edges of the division as closely as possible together, so as to give them an opportunity of uniting.

The first of these indications demonstrates more and more the utility, and even the necessity of the catheter. In women, its introduction is easy; but in them it is more difficult to fix the instrument, than in men. Desault contends, however, that it is very essential to have it favourably fixed in the bladder, so

that the urine may escape, immediately it arrives in this viscus. None of the means hitherto employed, seemed to Desault to answer this purpose completely. This eminent surgeon found, that the only effectual plan was to fasten the catheter to a point, that always retained the same position, with respect to the meatus urinarius. He used a kind of machine made after the manner of a truss, the circle of which was long enough to embrace the upper part of the pelvis, and had in its middle an oval plate to be placed upon the pubes. In the centre of this plate was a groove, to which a piece of silver was fitted, curved so that one of its ends having an aperture in it, came over the vulva, on a level with the meatus urinarius. This piece of silver admitted of being fastened to the plate with a screw. After having introduced, and arranged the catheter in the bladder, so that its beak and eyes may be situated at the lowest part of this viscus, the end of the instrument is to be put through the aperture of the piece of silver, which slides in the groove of the plate, and it is afterwards to be fixed in the way already explained. By means of this machine, the catheter is invariably fixed, without incommoding the patient even when she is walking.

In this disease, large catheters with full sized apertures should be employed, so that the urine may more readily escape through the instrument, than fall into the vagina. In the early part of the treatment, the catheters should also be left constantly open.

In order to fulfil the second indication, and keep the edges of the division as near together as possible, Desault advises us to introduce into the vagina, a soft kind of pessary, large enough to fill the vagina, without distending it. The introduction of this instrument changes the form of the fistula from round to oval, which is the most favourable to its reunion; and it has also the advantage of closing the fistula, and hindering the urine from falling into the vagina. These fistulæ often cannot be cured till after much time,—six months, and even a year.

When the rectum is wounded in the operation of lithotomy, an event that may be known both by the escape of the feces through the wound, and the introduction of the finger into the incision, or within the rectum, Desault advises us to divide at once the parts comprehended between the wound of the operation, the opening in the rectum, and the margin of the anus. This, he says, is the means of preventing the feces from passing into the bladder, and the urine into the rectum. This second operation allows the matter to escape readily, and cicatrization taking place from the bottom of the wound, in the direction outward, the patient is cured without any fistula; whereas this last grievance is almost inevitable, when the preceding plan is not adopted early. It deserves attention, that the catheter is then incapable of effecting a cure. It effectually prevents the urine from entering the fistulæ; but, it cannot keep the feces from doing so, which would keep up the disease.

For Desault's particular method of dividing the parts, I must refer to his works. (See *Œuvres Chirurgicales de Desault par Bichat, Tom.* 3, *p.* 287—300.)

URINE, INCONTINENCE OF. This complaint is quite the reverse of a retention of urine; for, as in the latter affection, the urine is continually flowing into the bladder, without the patient having the power to expel this fluid; so, in the former, the urine flows out, without the patient being able to prevent the occurrence.

An incontinence of urine may originate from several causes. 1. From the irritation of the neck of the bladder by stones. 2. From a paralysis of the sphincter vesicæ, while the contractile power of the muscular coat of the bladder remains in its natural state. 3. From laceration of the parts in the extraction of large stones, and a consequent paralysis of the sphincter after the wound has healed. 4. From the injury, which the parts suffer from pressure in difficult labours.

When an incontinence of urine proceeds from an irritation of the neck of the bladder by a stone, it can only be radically cured by the operation of lithotomy; though great relief may be given by mucilaginous and anodyne medicines, particularly, when given in the form of injections. In the other two cases, in which it is occasioned by a paralytic affection of the sphincter, we can only attempt the cure by such medicines as are proper in other paralytic cases, viz. the Peruvian bark, chalybeates, the cold bath, and other tonics; but, of all topical remedies, cold applications to the perinæum are found to be the most effectual. The most powerful remedy of this kind is to dash cold water upon the part; though it is sometimes found useful to apply cloths dipped in vinegar and water, or a solution of saccharum saturni, in the acetous acid.

When no relief can be obtained by the above proposed remedies, we must then have recourse to some mechanical method of compressing the urethra, and thus preventing the continual dribbling of the urine, which must always be very dis-

agreeable. A very proper instrument for this purpose is called a *jugum*, or yoke. It ought to be lined with silk or velvet; and, by means of the screw, the pressure may be made greater or lesser at pleasure. For women, we must make use of pessaries. These must be made of sponge, only of such a size as to be easily admitted, and, before it is introduced, it must be moistened with the finest olive oil, which, according to Mr. Latta, most effectually prevents it from becoming soon troublesome by excoriating the vagina. Pessaries, made of wood, can never be used in cases of this kind with effect; for, in placing them in the vagina, so as to compress the neck of the bladder, it is obvious they must at the same time press upon the rectum, and, on that account, prevent the natural passage of the feces. In some particular cases, even these palliative remedies prove ineffectual; for, when the disorder proceeds from an irritation on the neck of the bladder, the patient has such a continual desire to make water, that it is impossible to bear any confinement of it. We can then only employ proper receptacles for collecting it as it flows. In women these can only be by pieces of sponge, applied externally, and kept in that situation with a T bandage; but in men, other contrivances may be employed.

In the Medical Observations, we have some surprising instances of the efficacy of blisters in removing this complaint. A girl of thirteen years of age, who, for four years, had been able to retain her water only a very short time in the day time, and not at all during the night, was cured in twenty-four hours by the application of a blister to the os sacrum. A man, thirty-two years of age was attacked by this disease, accompanied with a palsy of the lower extremities, in consequence of having taken some virulent quack medicines, probably of the mercurial, or arsenical kind. In twenty-four hours after the application of a blister to the os sacrum, he was able to retain his water for an hour, and in a week after, for two hours. In about a month, he was able to retain it for five hours, and, at last obtained a perfect cure. He also recovered in some degree the use of his limbs, which were paralytic. The like good effects were produced on a woman of fifty, in whom the disease had been brought on by a strain. In her it was likewise accompanied with a palsy of the lower extremities, and of this too she got the better. In a woman of forty-three, in whom the disease seems to have come on without any evident cause, the cure was accomplished, almost during the time that the blister was rising. In a young man, who had been attacked with the disease, after lifting a heavy load, a cure was accomplished in sixteen days. A man of forty-four years of age, who had been attacked by the disease, without any evident cause, was in like manner cured on the first application of a blister. This man had likewise symptoms of diabetes; but, the blister had no effect in removing them. A boy, ten years of age, had violent complaints in the urinary passage, which were supposed to proceed from an ulcer. "When about to make water, he was obliged to put himself in a prone posture, and then his urine generally came away by drops, with exquisite torture. At length, it began to come away insensibly during the night;" but, by the application of a blister, this incontinence was removed in less than forty-eight hours, the other symptoms remaining as they were. In all these cases, the blisters were very large, covering not only the os sacrum; but extending from side to side. (*Latta's System of Surgery, vol.* 2.)

URINE, RETENTION OF. Mr. Hey has very truly remarked, that a retention of urine in the bladder, when the natural efforts are incapable of affording relief, is, in male subjects, a disease of great urgency and danger. Persons, advanced in years, are more subject to this complaint, than those, who are young, or middle-aged. It is often brought on by an incautious resistance to the calls of nature; and, if not speedily relieved, generally excites some degree of fever.

It is sometimes attended with a considerable degree of fever, and an inflammatory affection of the bladder, which terminates in a discharge of purulent matter, and a fatal hectic.

The distinction, says Mr. Hey, which has sometimes been made, between a *suppression* and *retention* of urine, is practical and judicious. The former most properly points out a defect in the secretion of the kidneys; the latter, an inability of expelling the urine when secreted.

The *retention of urine* is, an inability, whether total or partial, of expelling, by the natural efforts, the urine contained in the bladder. The characteristic symptom of this disease, previous to the introduction of the catheter, is a distention of the bladder (to be perceived by an examination of the hypogastrium), after the patient has discharged all the urine, which he is capable of expelling.

As this complaint may subsist, when the flow of urine from the bladder is by no means totally suppressed, great caution is required to avoid mistakes on this subject.

Violent efforts to make water are often

excited at intervals, and, during these strainings, small quantities of urine are expelled. Under these circumstances, the disorder may be mistaken for the strangury.

At other times, a morbid retention of urine subsists, when the patient can make water with a stream, and discharge a quantity equal to that, which is commonly discharged by a person in health. Under this circumstance, Mr. Hey has known the pain in the hypogastrium, and distention of the bladder, continue, till the patient was relieved by the catheter.

And lastly, it sometimes happens, that when the bladder has suffered its utmost distention, the urine runs off by the urethra, as fast as it is brought into the bladder by the ureters. Mr. Hey has repeatedly known this circumstance cause a serious misapprehension of the true nature of the disease.

In every case of retention of urine, which this gentleman has seen, the disease might be ascertained by an examination of the hypogastrium, taken in connection with the other symptoms. The distended bladder forms there a hard and circumscribed tumour, giving pain to the patient when pressed with the hand. Some obscurity may arise upon the examination of a very corpulent person; but, in all doubtful cases, the catheter should be introduced.

Mr. Hey mentions, that he has seen but a few cases of the *ischuria renalis*, or complete suppression of the secretion of urine by the kidneys. The disease proved fatal in all his patients except one, in whom it was brought on by the effect of lead, taken into the body by working in a pottery. It subsisted three days, during a violent attack of the colica pictonum, and was then removed, together with the original disease. Mr. Hey found no difficulty in distinguishing this disorder, in any of the cases, from the *ischuria vesicalis*, though, for the satisfaction of some of his patients, he introduced the catheter. (*Practical Observations in Surgery*, p. 374, &c.)

Ischuria, or retention of urine, may be the effect of a great many different causes. We shall proceed to take notice of the causes, which are produced by a paralysis of the bladder; by inflammation of its neck; by foreign bodies in it; by pressure made on it by the gravid uterus; by an enlargement of the prostate gland; and by strictures in the urethra.

1. OF THE RETENTION OF URINE CAUSED BY A PARALYSIS OF THE BLADDER.

This complaint, to which persons advanced in life are particularly subject, may occur in subjects of any age, in consequence of a violent concussion of the spinal marrow, or (what is very common) if, after having taken a large quantity of drink at a time, a person should neglect to obey the calls of nature, and hold his urine too long. It is also observed to be a symptom of certain typhoid fevers, and, consequently, too great attention cannot be paid to the state of the bladder in such disorders. The retention of urine is easily ascertained to exist by the prominence, which it forms above the pubes; a prominence, which may be readily distinguished by its elasticity and circumscription from the general tension of the abdomen, so common in this disease. A retention of urine may either come on in a gradual or sudden manner. In the first sort of case, it begins by a kind of debility, which hinders the patient from completely emptying his bladder, so that, after having made water, he still feels an inclination to repeat the evacuation, and is compelled to make frequent efforts to do so. This inconvenience gradually increases; at length, none of the urine can be discharged; and the bladder rises higher than the pubes, above which part it forms a round circumscribed tumour, the size and elasticity of which are more or less considerable.

In the second kind of case, or that which occurs suddenly, the retention of the urine is the first symptom, which the patient experiences, and his bladder becomes filled, and distended, in the same manner, as in the preceding case. Most frequently, the swelling, which this viscus forms, is at first not very painful, but, afterwards becomes very much so. Some patients make frequent efforts to expel their urine; others are more tranquil. This state lasts two, or three days, after which the urine begins again to escape from the urethra, sometimes by drops, sometimes in a stream, but, almost always, at the will of the patient. In some instances, as much urine is voided, as the fluid, which is drunk; yet, notwithstanding this, the bladder continues to be distended with urine, and to form an elevation above the pubes. This circumstance has frequently led practitioners into error, and some of them have even mistaken the swelling of the hypogastric region for an abscess. Collot mentions, that, in his time, this mistake happened very frequently, and that such supposed abscesses would have been often opened, had not the patients warned their medical attendants of the erroneous opinion. M. Sabatier informs us, that he was consulted about a woman, who had been advised to resort to the mineral waters, with a view of dispersing a tumour, which had occurred in consequence of a difficult labour, and which swelling was supposed to be

situated in the uterus. The tumour, however, was nothing else, than the bladder, distended with an accumulation of urine, since it disappeared as soon as a catheter was introduced. No suspicion had been entertained of the real nature of the case, in consequence of the patient having voided her urine in a voluntary manner, and reasonable quantity, for five, or six weeks, during which time the swelling had existed.

M. Sabatier makes mention of a case, inserted in a thesis by Dr. Murray, from which it appears, that the swelling of the bladder may become so considerable as to lead to mistakes of a still more serious nature. A delicate woman found her abdomen swell without any apparent cause, and without experiencing any inconveniences. She imagined, that she was pregnant. However, she was soon undeceived by the rapidity, with which her abdomen continued to enlarge, and by the considerable degree of anasarca affecting her lower extremities. The latter affection extended also to the arms, and face. The patient was considered to be dropsical; and a surgeon was sent for to tap her. The fluctuation of a fluid in the abdomen was quite evident. Some diuretics were prescribed, before having recourse to the operation. While such remedies were put to a trial, the patient complained of having had a total retention of urine for three days; a symptom, which she had not previously suffered. The belly was elastic, and the veins on it were every where swollen. It was judged prudent to introduce a catheter, before employing the trocar. The surprise was very great when eighteen pints of urine were drawn off, and the swelling of the abdomen subsided. The next day, the catheter drew off twelve more pints of urine. The anasarca, which was entirely symptomatic, disappeared. The application of cold water re-established the tone of the bladder, so that, when three pints of urine had been drawn off by means of the catheter, the patient herself could spontaneously expel three or four others, with the aid of some degree of pressure on the hypogastric region. Dr. Murray endeavoured to ascertain, whether the woman got completely well; but, he could not trace this circumstance.

The retention of urine, produced by a paralysis of the bladder, and the swelling, which this viscus occasions above the pubes, may continue for a long while, without patients feeling any other inconvenience, than a sense of weight about the region of the pubes, and the frequent inclinations to make water, which accompany this state. M. Sabatier mentions his having seen patients, who had been attacked by the complaint for more than six months.

The disorder may be relieved by introducing a catheter into the bladder, by which means the urine has an opportunity of escaping. For an account of the manner of introducing this instrument, see *Catheter*.

It is not enough to empty the bladder, care must be taken to prevent the urine from accumulating again, and, consequently, the catheter, according to some, must be left introduced. Others are of opinion, that it is better to pass the instrument whenever the patient has any occasion to make water. According to Desault and Mr. Hey, the bladder regains its contractile power soonest, when the catheter is introduced as often as occasion requires, instead of being allowed to remain continually in the urethra.

When the retention of urine has lasted a considerable time, when the hypogastric region is painful, and the patient is feverish, venesection may be performed, and, in all cases, diluent beverages, of a slightly astringent nature, are to be prescribed. The intestines are to be emptied with glysters, and the regimen is to be regulated by the condition, in which the patient happens to be.

For a certain length of time, things remain in this state. When the urine flows from the catheter in a rapid stream, which is projected to some distance, and when it also passes out between the catheter and the urethra, it is a sign, that the bladder has regained its power of contraction, and that it can empty itself, without the aid of the instrument. In this circumstance, the catheter is to be taken away, and the patient may gradually resume his occupations, and usual mode of life. When the urine only escapes through the catheter, and in a slow stream, the employment of this instrument is always requisite, and its use cannot be discontinued, without hazard of the bladder becoming distended again, and losing whatever degree of tone it may have recovered. However, a catheter cannot be suffered to remain in the bladder more, than twelve days, or a fortnight. Some persons have in their urine so much mucus and earthy matter, that an incrustation would not fail to take place on the instrument, if care were not taken, every now and then, to withdraw it and clean it. In other persons, the pressure, which the catheter makes on the part of the urethra, corresponding to the root of the penis, in front of the scrotum, occasions in this situation an inflammation, which ends in mortification, so that a slough about as large as a crown, takes place, followed by an opening with loss of substance, which opening remains fistulous during the remainder of the patient's life. The latter inconveniences do not attend the employment of flexible gum-catheters.

The time, which the bladder takes to regain the power of contracting, varies considerably in different cases. When the disease is accidental and sudden, it frequently goes off in a few days. When it has come on in a slow manner, it usually lasts about six weeks. The cure, however, is not to be despaired of, if the paralytic affection of the bladder should continue much longer. M. Sabatier says, that he has seen patients wear a catheter upwards of ninety days, and yet ultimately get completely well. When there is reason for believing, that the urine will come away of itself, the use of the catheter may be discontinued, great attention being paid to the state of the patient. When he makes water very slowly; when he is obliged to make frequent attempts; and when he feels a sense of weight about the neck of the bladder; this viscus has not recovered the whole of its tone, and the employment of the catheter is still necessary. Sabatier states, that he has often successfully recommended the cather to be worn only in the night-time, when the patient could make water tolerably well in the day, and experienced the above complaints in the night.

When three or four months elapse, without the urine resuming its ordinary course, Sabatier informs us, that, we may be sure, that the tone of the bladder is lost for ever. In this unfortunate case, all that can be done is to advise the patient to make continual use of a flexible catheter, which he should be taught to introduce himself, whenever he has occasion. See *De la Médecine Opératoire par Sabatier*, *Tom.* 2.)

Among the means deserving of trial, when the contractile power of the bladder does not return with the use of the catheter, I have to mention the tincture of cantharides; blisters applied to the sacrum, and kept open with the savine ointment; and cold washes to the hypogastric region.

2. OF THE RETENTION OF URINE, OCCASIONED BY INFLAMMATION OF THE NECK OF THE BLADDER.

This case makes its attack with the most urgent symptoms. Besides the inclination to make water, and the efforts, which such inclination causes, the patient is affected with a swelling of the bladder above the pubes, a deep-seated pain in that viscus and all the neighbouring parts. Fever, nausea, vomiting, a urinary smell in the breath, and perspiration, great restlessness, a difficulty of breathing, convulsions, and death, are the train of evils, which may ensue.

The present kind of retention of urine demands the employment of the antiphlogistic plan of treatment; particularly, of bleeding, diluent emollient beverages, glysters, the warm bath, and anodynes. When these are unavailing, the catheter should be resorted to, and its use should never be deferred so long, as to afford any chance of the distention of the bladder occasioning a paralysis of this viscus. When the catheter cannot be introduced, the operation of puncturing the bladder is immediately indicated. See *Bladder*.

3. OF THE RETENTION OF URINE, OCCASIONED BY FOREIGN BODIES IN THE BLADDER.

Several kinds of extraneous matter may be lodged in the bladder; for instance, stones, worms, pus, blood, &c. Here, we shall only treat of the retention of urine, originating from the presence of stones, or of blood, because these causes are the most frequent.

One, or more stones in the bladder give rise to particular symptoms, explained in the articles *Calculus*, and *Lithotomy*. They seldom occasion a total retention of urine. If such a case were to present itself, it might be easily understood by preceding circumstances. The complaint might be relieved, and this, perhaps, for a considerable time, by introducing a sound, which would push the stone away from the neck of the bladder, towards the fundus of this viscus. Instances are not uncommon, in which the patients, after having been tormented by the lodgment of stones in the bladder, became afterwards quite free from all kind of uneasiness. Sabatier makes mention of a clergyman, who was sounded by a very skilful surgeon, and who finding himself afterwards free from the pains, which he before suffered, thought, that the surgeon had been mistaken, when he said, that there was a stone in the bladder, and that lithotomy ought to be performed. The patient also bequeathed his body for dissection to the surgical practitioner, in order that the latter might reap instruction from the examination. The surgeon accepted this odd legacy; and, when the body was opened in the presence of numerous spectators, a large stone was found in the bladder.

Blood may descend from the kidneys into the bladder; or it may accumulate in this latter receptacle, in consequence of some injury, or ulceration of its inner coat. When the blood remains in a fluid state, it may be voided almost as easily as the urine itself. But, when it coagulates, the clots, which are formed, may obstruct the neck of the bladder, and occasion a retention of urine; a case, which is the more alarming, as the collection of blood generally cannot be drawn off by means of a

catheter. However, one of a very large size should be introduced, in order to try whether the thing is practicable. When this method fails, authors advise a syringe to be fastened on and adapted to the outer end of the catheter, by which means the blood and urine are to be sucked, as it were, out of the bladder. Sabatier states, that this plan has been practised with success, in cases, which seemed almost desperate.

4. OF THE RETENTION OF URINE, CAUSED BY THE PRESSURE OF THE GRAVID UTERUS ON THE BLADDER.

Such pressure often occasions a difficulty of making water, and a retention of urine. Women relieve themselves by leaning down on their knees and elbows, in which position, the uterus makes less pressure on the neck of the bladder. Some introduce one, or two fingers into the vagina, and push the uterus upward. Others must have the catheter introduced, particularly, about the period of parturition. When there are no other impediments to the passage of the catheter, than the cause of the disease, the instrument may easily be introduced.

When, however, the course of the meatus urinarius is rendered crooked, either in consequence of an old prolapsus uteri, or of the pressure occasioned during labour, the urine can only be drawn off by means of a catheter, with a rounded end, which instrument should be first introduced with its handle as much towards the belly as possible, after which, this part of the instrument is to be brought downward by a semicircular motion. (*Sabatier Médecine Opératoire, Tom.* 2, *p.* 137.)

5. OF THE RETENTION OF URINE CAUSED BY THE ENLARGEMENT OF THE PROSTATE GLAND.

When the swelling of the prostate gland is of an inflammatory kind, the retention of urine makes its appearance by symptoms, which always attend an inflammation of the neck of the bladder. This affection sometimes ends in an abscess, which bursts of itself. Some writers have considered about the propriety of making an incision into the suppurated gland; but, such a proceeding, perhaps, can never be at all justifiable, or prudent.

The diseased enlargement of the prostate gland has been treated of in another part of this Dictionary. See *Prostate Gland*. The retention of urine, occasioned by this disease, begins with a difficulty of making water, just such a kind of difficulty, as occurs when the bladder has been deprived of some of its contractile power, and receives relief from the use of slightly diuretic beverages. When the complaint becomes more urgent, and the urine cannot be any longer evacuated, the introduction of a catheter becomes indispensable. Although this operation is, in every respect, perfectly easy of accomplishment, it is not always attended with the desired success. The catheter passes in as far as it can; but, the urine is not discharged, because the end of the instrument, according to Sabatier, becomes entangled in the prostate gland, or between a swollen portion of this gland and the neck of the bladder, and does not reach to the situation of the urine. Hence, Sabatier recommends the employment of a catheter with a very long beak. From the account, however, which we have delivered of the alteration produced in the course of the urethra by the morbid enlargement of the prostate gland, (see *Prostate Gland,*) it appears, that the canal in question generally makes, in this case, a sudden turning upward, just before it approaches the bladder, consequently, when a catheter has its end bent a little more upward, than usual, it is best adapted for passing into the bladder, in the affection under consideration. When the surgeon has succeeded in introducing a catheter, it is to remain introduced, till the bladder has recovered its tone, or contractile power, just as was recommended in the case of paralysis of this viscus. When, however, all efforts to pass a catheter are quite ineffectual, the only remaining resource is to puncture the bladder above the pubes. (See *Bladder, Puncture of.*) The operation should never, in this case, be done through the perinæum, or rectum, as the very great size, which the diseased prostate gland sometimes attains, would be an obstacle to making a puncture in either of these situations. Puncturing the bladder, however, is only a temporary means of relief, unless this organ recovers its contractile power, or the surgeon succeeds in introducing a catheter through the urethra. When neither of these circumstances occurs, the cannula of the trocar must not be withdrawn.

The objections, which immediately present themselves to leaving in the cannula, for any considerable time, are: the irritation of the extraneous body; the fear of calculous incrustations forming both on the outside and inside of the cannula; and the hazard of not being able to find out again the track into the bladder, when the instrument is ever withdrawn. However, Sabatier confirms, that the cannula may sometimes be successfully allowed to remain in the bladder. Collot adduces two instances, in which he found this method very serviceable. Sabatier also re-

fers to another example of similar success, related in a thesis by Murray. An incision had been made above the pubes, in order to be more easily able to introduce the trocar into the bladder. The wound inflamed, suppurated, and was in a healing state; but, as the urine could not be voided through the urethra, the cannula was left in the puncture. Things had gone on in this manner, more than a year, when Dr. Murray saw the patient. The man was sixty years of age, and enjoyed very good health. He was in the habit of taking a stopper out of the cannula, every four hours. The wound had healed very well all round the tube, and was quite free from redness.—(*Sabatier, Médecine Opératoire, Tom.* 2. *p.* 140.)

6. OF THE RETENTION OF URINE PRODUCED BY STRICTURES IN THE URETHRA.

From the account, which is given of strictures in another part of this Dictionary, (see *Urethra, Strictures of,*) it appears, that almost every stricture, how bad soever it may be, is capable of being rendered still worse, and the morbid part of the urethra, more impervious by a spasmodic affection. Going out of a warm into a cold situation, drinking, and other kinds of intemperance, will often bring on an irritable state of the canal, attended with a spasmodic action of the strictured part, an increased difficulty of voiding the urine, and even a total retention of this fluid. The patient makes repeated efforts to relieve himself; but hardly a drop of urine is discharged. In the mean while, the bladder becomes filled, and ascends above the pubes; the abdomen grows tense and painful; fever comes on; the countenance looks red; the brain becomes affected; and circumstances assume an extremely urgent appearance.

In this case, antiphlogistic means should be adopted, without delay. The patient ought to be bled, if nothing in his constitution and age prohibits this evacuation, which it may even be proper to repeat. He should also be put into the warm bath, and fomentations should be continually applied to the hypogastric region. Slightly diuretic beverages may be prescribed; and leeches put on the perinæum. The principal means, however, from which the greatest benefit may be expected, is a liberal dose of the tinctura opii, together with an anodyne glyster. When such measures fail in enabling the patient to empty his bladder, and this viscus is becoming more and more distended, an immediate attempt should be made to introduce a small flexible elastic gum-catheter, through the stricture or strictures into the bladder, which object may be frequently accomplished, when due care, perseverance, and gentleness are not neglected.

Sometimes when a small flexible catheter cannot be introduced, a fine bougie admits of being passed into the bladder, and, on being withdrawn, the urine follows, and is discharged.

When all the preceding plans prove unavailing, and the danger arising from the retention of urine, continues to increase, the only remaining resource is to puncture the bladder. The cannula of the trocar should then be left in the wound, till the strictures are either cured, or at least till the urine seems to resume its natural course through the urethra.

Useful information on the subject of retention of urine, may be found in *De la Médecine Opératoire, par Sabatier, tom.* 2. *Hey's Practical Observations in Surgery. Desault's Parisian Chirurgical Journal. Home's Practical Observations on the Treatment of Strictures, &c. vol.* 2. 1803.

UTERUS, INVERSION OF. This case may either be complete, or incomplete. When it is incomplete, only the fundus of the uterus passes through the os tincæ. When the inversion is complete, the uterus becomes entirely turned inside out, passing through the opening in its cervix, dragging along with it a part of the vagina, and descending more or less far down, sometimes even between the patient's thighs.

The inversion of the uterus mostly arises from the manner in which the placenta is extracted after delivery. Just after parturition, the parietes of the uterus have not had time to become contracted, and the mouth of this viscus is as capacious as it can possibly be. It is easy of comprehension, how it may happen, that, when things are thus disposed, the uterus may follow the after-birth, which is attached to the parietes of this organ, and thus become inverted. The event is particularly liable to happen; 1st, When a premature attempt is made to extract the placenta. 2dly, When the funis is pulled outward, without any care being taken to support the uterus by the fingers of the left hand. 3dly, When the operator draws the after-birth outward in too rough and forcible a manner. It is true, that the placenta is sometimes so adherent, that its extraction is very difficult, and some risk must be encountered of dragging down the uterus with it. However, this unpleasant occurrence may generally be avoided by taking care to separate the placenta, by introducing one's fingers into the cavity of the uterus.

The inversion of the uterus, following parturition, should not always be ascribed

to unskilfulness on the part of the practitioner. The accident frequently happens, notwithstanding every precaution to prevent it, either because the patients make too violent efforts to deliver themselves; or because the uterus is enlarged and heavy; or else in consequence of some natural disposition in the uterus, which disposition can neither be foreseen nor prevented. Ruysch has seen an inversion of the uterus take place, after the expulsion of the placenta, although the delivery had occurred in the most favourable way. This disposition is very common in persons, who have once been afflicted with an inversion of the uterus. Amand makes mention of a case, in which a woman, who had had an inversion of the uterus in her first delivery, and who had been cured of it by this practitioner. The same patient was attended by Amand again in her next accouchement, and another inversion of the uterus, quite as bad as the first, would certainly have happened, had not Amand, on perceiving the disposition to the accident, introduced his finger into the cavity of the uterus, in order to separate the placenta from its attachments, before making any attempt to extract it.

Besides the causes of the inverted uterus, which are connected with parturition, there are some others, which have no concern with it whatsoever. Ruysch, Mauriceau, and Lamotte, were of opinion, that the inversion of the uterus could only happen at the time, when the placenta was extracted, or a little while afterwards, The occurrence seemed to them quite impossible at any other period, both because the substance of the uterus is very thick and solid, and its mouth is very contracted. However, Sabatier remarks, that there are many facts, which prove that this disease may depend on internal causes, and that it may affect women, who have had no children, as well as others, who have had them. Polypi of the uterus are causes of this kind. As their pedicle is attached to the fundus of the uterus, and is very firmly inserted into it, they may easily drag it downward, when its texture is lax and soft, particularly, as their action, arising from their weight, is continual and uniform. We may also reckon among the causes, the hemorrhages, to which women are subject, both because they relax the texture of the uterus, and because they are usually attended with an acute pain, which makes the diaphragm and abdominal muscles contract, and act upon the uterus with all their power.

When an inversion of the uterus takes place after delivery, there are symptoms, by which it may easily be known. The uterus, when in its natural situation, presents itself in the hypogastric region in the form of a round circumscribed tumour; but, when it has fallen downward, and become inverted, the above tumour cannot be found, and, a vacancy may be felt in the situation, which it ought to occupy. When the inversion is incomplete, an examination with the fingers detects in the vagina a tumour, shaped like the segment of a sphere, having a smooth surface, and being surrounded with the cervix uteri, as with a kind of collar, round which the finger may easily be passed, either between the kind of collar and the uterus, or between the collar and the vagina. When the inversion of the uterus is complete, there is in the vagina, and sometimes quite protruded, a tumour, apt to bleed, of an irregularly round shape, with a smooth surface, and hanging by a neck, which is surrounded by the above circular, thick, fleshy, substance, consisting of the os uteri itself. In the incomplete inversion, patients feel acute pain in the groins, and kidneys, an oppressive sense of heaviness in the hypogastric region, and a tenesmus, which, compelling them to make violent efforts, forces the uterus down more and more, and produces a total inversion of it. To such symptoms are often added hemorrhages, which are more or less copious. But, when the inversion is complete, the pain is more acute, the loss of blood more considerable, and the patient is often affected with peculiar weakness, which is frequently followed by cold sweats, convulsions, and delirium.

The reduction of the uterus is the only method, by which the above described sufferings can be appeased, and it ought to be put in practice the more quickly, in proportion to the urgency of the symptoms. When these are pressing, the least delay may be followed by the worst consequences. Some women, indeed, perish in a few hours, and, when they live longer, the reduction becomes exceedingly difficult, because the uterus and its cervix are continually becoming more and more contracted.

Sabatier censures the advice to put some linen between the hands and the uterus, in making the reduction, as an unnecessary measure, and one, which bereaves the operator of the information to be derived from the organ of touch, relative to the progress of the operation. The manner of proceeding can hardly be determined by any precepts. It must be regulated by existing circumstances; and the trial should not be abandoned as long as the patient's strength will allow a perseverance. Perhaps, however, if the tumour should be in an inflamed state, it

might be prudent, before attempting to reduce it, to take away blood, put the patient in the warm bath, use emollient applications, exhibit anodyne medicines, &c.

When the inversion of the uterus is complete and the reduction has not been accomplished in due time, an endeavour must be made to quiet the spasms and pain arising from the accident, and the surgeon must await what nature will do for the patient. Many die; while others survive, subject to an oppressive sense of weight, and frequent hemorrhages, which bring on great emaciation. Sabatier informs us of his having seen two patients, who had had an inversion of the uterus, during six months, and who were still able to go about their family affairs. The same author says, he has heard of some other persons, who have had an inversion of the uterus several years.

One of the most afflicting consequences, which may result from an inversion of the uterus, is so considerable an inflammation of the part, as to induce a danger of its mortifying. In this circumstance, some have proposed to extirpate the uterus; an operation, however, that has not been attended with any degree of success, as the majority of patients, on whom it has been practised have died. However, there are instances recorded of women having recovered after such an operation. Vieussens has related a case of this kind, in which a ligature was applied round the neck of the swelling, and the part below amputated.

The practice of extirpating the inverted uterus, through apprehension of the part mortifying, however, cannot be reprobated in terms too strong. The only alledged reason for having recourse to the operation, is the very considerable degree of inflammatory swelling, which affects the part. But, it is not altogether impracticable to bring the uterus into a state again, in which the inconveniences, arising from its inversion, would be very supportable, so that an operation might be avoided, which is always attended with extreme danger. Even supposing mortification were to take place, the indication would be to appease the bad symptoms, and promote the separation of the sloughs by suitable applications. Rousset has recorded an example, in which the latter mode of practice was adopted with success.

Some writers have not been content with advising the extirpation of the uterus, when it is entirely inverted, very painful, and irreducible, in consequence of the contracted state of the cervix of this organ; but, they have also thought such a proceeding proper in cases of a complete prolapsus, when the part is much swollen and inflamed. Instances have been adduced, illustrative of the success of this operation. However, it is now generally thought, that most of these examples are invalid, as polypi, growing from the uterus, frequently attain so considerable a size, that they protrude out of the vagina, so as to have occasionally been mistaken for the uterus itself. These have been extirpated with a ligature, with most beneficial consequences to the patient.

There is no doubt, however, that, in a few instances, the uterus has been amputated, and the patient has recovered.

Although it is easy to distinguish the inversion of the uterus, which happens soon after delivery, it is not so to make out the nature of such cases, as happen in other circumstances, notwithstanding the presence of the same kind of symptoms. As cases of the latter kind are exceedingly uncommon, and, consequently, they are not at all expected, mistakes are the more liable to be made. A very little attention suffices for discriminating an inversion of the uterus from a polypus, with which it has sometimes been confounded. In short, the pedicle of a polypus is always narrow; the tumour is not very sensible, and is irreducible; whereas the uterus forms a semi-spherical swelling, sometimes a little oblong, but, always broader above, than below. It is very sensible, and may be easily reduced.

The reduction of the inverted uterus is also the only step, which can be taken, whether the accident has arisen from the weight of a polypus, or from hemorrhages. However, this proceeding is generally useless, when the disease originates from obesity. In the latter case, as the cause still continues in full force, it in general soon displaces the uterus in the same way, as before, and a pessary is the only means, to which the patient can resort. This instrument is to be worn, rather with a view of supporting the weight of the abdominal viscera, which pushes the uterus down into the vagina, as well as the fundus, through the cervix of the womb, than with any design of preventing the inversion. (*Sabatier, Médecine Opératoire, tom.* 2.)

UTERUS, POLYPI OF. See *Polypus.*

UTERUS, PROLAPSUS OF. This may take place in three different degrees. When the prolapsus occurs only in its first or second degree, the uterus is situated in the vagina, where may be felt a pyriform tumour, round which it is easy to pass the end of the finger. At the lower part of this tumour, an opening, placed transversely, may also be distinguished. In the first, or slightest degree, the uterus is situated higher up, than in

the second. When the disease has proceeded to the third, or last degree, the uterus is completely protruded out of the vulva. In the latter circumstance, it always drags down the vagina, which becomes doubled on itself, and it also draws down a part of the bladder, which is connected with the upper part of the latter tube. It also sometimes happens, that some of the abdominal viscera insinuate themselves into the kind of cul-de-sac, formed by the vagina, and they then considerably increase the size of the tumour. The swelling, occasioned by a complete prolapsus of the uterus, is of an oblong, nearly cylindrical form, and it terminates below in a narrow extremity, in which a transverse opening, the os tincæ, may be discerned, from which the menses are discharged at the periods prescribed by nature. The cylindrical shape of the tumour is the more apt to lead to mistakes, as the vagina, being doubled on itself, and exposed to the effects of the air, sometimes assumes an appearance very similar to that of the skin. Hence, women, afflicted with a complete prolapsus uteri, have sometimes been regarded as hermaphrodites, in consequence of the tumour having been mistaken for a penis. Saviard has recorded an instance, in which this kind of error was made.

The inconveniences, arising from the first and second degrees of prolapsus uteri, are a sense of heaviness in the pelvis, and a degree of uneasiness in the kidneys. These complaints are aggravated, when the patient sits up or walks about. On the contrary, they diminish, and even entirely subside, when the patient has remained a certain time in bed.

The symptoms, attending a complete prolapsus uteri, are of a more severe nature. The patient experiences a greater sense of heaviness in the pelvis, and pain and dragging in the loins. She is troubled with tenesmus, and sometimes feels acute pain in the tumour itself, which is subject to inflame, and ulcerate, in consequence of its depending posture, the friction, to which it is exposed, and the irritation of the urine, as this fluid runs over it.

The uterus, when only affected with the first or second degree of prolapsus, may be easily reduced. Indeed, it often resumes its natural situation, when the patient is put in a position, in which she lies on her back, with her loins raised a little higher, than her chest. When this method is insufficient, the fingers may be introduced into the vagina, for the purpose of accomplishing the reduction. The patient suffers no pain, at the time when the reduction is performed, which, for the most part, takes place spontaneously. By the latter circumstance, a prolapsus uteri may be discriminated from polypi, either of the uterus, or vagina, which tumours do not admit of being reduced, which are in shape, broader below, than above, and which present no aperture, similar to the os tincæ.

When the uterus is affected with a complete prolapsus, the reduction is not so easy of accomplishment. The great number of parts, which the displaced viscus drags downward with it, and the tumefaction, which sometimes follows, render it necessary to take some preparatory measures, before trying to replace the part in its natural situation. For this purpose, the patient should be kept in bed, be put on a low regimen, be bled, take purgative medicines, use the warm bath, and drink diluent beverages, while emollient applications are to be made to the part itself. This plan of treatment has often been attended with complete success, in cases of prolapsus uteri, of long standing and considerable size. Ruysch was against making any attempt to reduce the uterus, while this part was inflamed and swollen. He also thought, that the operation should be postponed when the uterus was in an ulcerated state. However, Sabatier observes, that, as this complication is only an accidental one, and merely arises from the friction, to which the tumour is exposed, and the irritation of the urine, the plan of immediately replacing the part cannot be attended with any danger. On the contrary, since the cause which produces and keeps up the ulceration will cease, as soon as the reduction is accomplished, it follows, that, the sores will soon heal after the uterus is put into its natural situation again.

When we reflect on the position of the uterus, on the strength of the ligaments, destined to support it, and on the manner in which the vagina is connected with the surrounding parts, we cannot easily conceive, how the womb can become so much displaced, as it is in cases of complete prolapsus. It is still more difficult to comprehend, how the uterus can become displaced during pregnancy, even when this viscus has attained its utmost state of distention. However, this sort of case has frequently happened. Sabatier remarks, that he could adduce several examples, and quotes an instance from the *Traité des Accouchemens de Portal.*

The prolapsus uteri, which occurs during pregnancy, demands the utmost care. The part is capable of being reduced, while the patient is in the early stage of pregnancy. When pregnancy has far advanced, or the disease is of long standing, the reduction is difficult. Perhaps, says Sabatier, it may be more prudent in these circumstances, to let the uterus continue

protruded, than to disturb the mother and fœtus with reiterated attempts to reduce the part. The uterus, however, should not be left to itself; but be well supported with a suitable bandage, and the patient ought to be kept in her bed. When the prolapsus uteri occurs at the very period of delivery, every attempt at reduction is both useless and dangerous. In this case every exertion should be made to promote the delivery of the fœtus, by gradually dilating the os tincæ, which should, at the same time, be carefully supported. The extraction of the placenta also requires a great deal of caution, and it should be accomplished by introducing a hand into the uterus, with the palm turned away from the cavity of this viscus, towards the outside of the placenta, which is to be gradually separated by proceeding from one of its edges towards its centre.

In cases of complete prolapsus uteri, Ruysch was an advocate for leaving the expulsion of the fœtus, if alive, to be effected by nature; and the same writer advises us to be content with supporting the os tincæ. But, when the child is dead, he recommends extracting it with one hand, while the uterus is supported with the other. Sabatier, however, entertains different sentiments. The expulsion of the child is not less the effect of the contraction of the diaphragm and abdominal muscles, than of the womb itself. Hence, it is easy to conclude, that when either of these agents fails in co-operating, the delivery becomes either very difficult, or impossible. This is exactly what happens in the present case; for, the uterus having fallen down, can no longer be compressed by the action of the diaphragm and abdominal muscles. Sabatier sets down the practice, advised by Ruysch, as an exceedingly dangerous one; because, the efforts, made by the mother to deliver herself, would have a tendency to render the prolapsus uteri more complete, and thus increase the dragging of all those parts, with which this organ is connected. Sabatier, also, cannot discern the reason why Ruysch should recommend the line of conduct to differ, according to the different state of the child. This is, probably, quite passive in parturition, and contributes not in the least to its own expulsion. Sabatier, therefore, contends, that the treatment should not be at all influenced by the consideration of the child being dead or alive.

In whatever degree a prolapsus uteri has taken place, it is not sufficient to have reduced the part. The prolapsus would soon recur, if it were not prevented by the employment of astringent injections and pessaries. (See *Pessary*.)

UTERUS, RETROVERSION OF.

A retroversion of the uterus is said to happen, when the fundus of this viscus, carried by its own weight, and forced downward by the action of the diaphragm and abdominal muscles, becomes situated between the sacrum and posterior part of the vagina, while the cervix uteri becomes inclined towards the symphysis pubis. This kind of case was not understood till about the middle of the preceding century. Sabatier states, that Gregoire, a member of the college of surgery at Paris, first mentioned it in his private instructions in midwifery. Walter Wall, an English surgeon, who had attended Gregoire, suspected, that he had met with a retroversio uteri in a woman, some months advanced in pregnancy, and he called in Dr. Hunter, in order to have the advantage of his advice. The woman was attacked with an obstinate constipation, and retention of urine, and died in about a week. A large tumour was found occupying the whole of the pelvis, and pushing the vagina against the os pubis. It had been found impracticable to push the swelling back into the abdomen, although the patient had been put on her knees and elbows, while one hand had been introduced into the vagina, and two fingers of the other hand into the rectum. Some curiosity was entertained, concerning what state things would be found in. Opening the body shewed, that the bladder, which was exceedingly full of urine, occupied almost the whole anterior part of the abdomen, in the same manner as the uterus does in the last month of pregnancy. When the bladder had been emptied, that part of it, in which the ureters terminate, and which is connected with the vagina and cervix uteri, was found raised up, as high as the upper aperture of the pelvis, by a large tumour, which filled the whole cavity of the pelvis, and was found to be the uterus. A catheter, when passed into the vagina, could be made to lift up the latter viscus, and the upper part of the tumour. This portion of the swelling, on which the bladder lay, consisted of the cervix uteri, while the fundus of this organ was situated downwards towards the os coccygis and anus. The uterus had attained such a magnitude, that it could not be taken out of the pelvis, before the symphysis pubis was divided, and the two ossa innominata were pulled asunder. It was found impossible to assign any cause for the manner, in which the uterus had become displaced, as the patient had been making no exertion, had met with no fall, and had only been frightened at something just before the complaint commenced.

Dr. Hunter, struck with the singular nature of the case, thought it deserving of

attention among medical men, and he made it the subject of a lecture, which he delivered to his pupils in 1754. He was afterwards consulted by several persons, who were afflicted with the retroversio uteri; but, not in so acute a way, as in the above instance. All the patients were in the third month of pregnancy, and first suffered a difficulty of making water, succeeded by a retention of urine, and afterwards by constipation. Dr. Hunter always emptied the bladder by means of a catheter and glysters, which measures sometimes effected a cure, the uterus spontaneously resuming its natural position. In every instance, the accident disappeared, when pregnancy was more advanced, and the uterus had acquired larger dimensions. Success was not always obtained: for, in some cases, in which Dr. Hunter was consulted too late, the trials to replace the uterus proved fruitless, and the women died. Dr. Hunter was so firmly convinced of the impossibility of saving patients, circumstanced in the above manner, unless extraordinary means were resorted to, that he thought one should endeavour to diminish the size of the uterus, by introducing a trocar into the body of this viscus, through the posterior parietes of the vagina, so as to let out the water of the amnios, the relative quantity of which is known to be greater, in the early, than in the advanced, stage of pregnancy.

Such a puncture might certainly be the means of the uterus resuming its natural position; but, there would be considerable danger of its exciting the contraction of the uterus, and causing abortion. No risk of this kind would be encountered by puncturing the bladder above the pubes. In this manner, a free passage would be afforded for the escape of the urine, and the reduction of the uterus might be effected.

Mr. Lynn, a surgeon in Suffolk, has seen the bladder burst, and the urine become extravasated in the abdomen, in a case of a retroversion of the uterus, in consequence of the patient's refusal to submit to the preceding operation. The woman was forty years of age, of a relaxed habit, mother of several children, and had been pregnant four months. She had been for some time before afflicted with a prolapsus of the vagina. The swelling had been a few days reduced, when, in consequence of tripping, she felt something become displaced in her abdomen, and fall towards the lower part of her back. She was immediately attacked with constipation, retention of urine, nausea, and pain in her belly. The means, which were employed, not proving effectual, Mr. Lynn suspected, that a retroversio uteri had happened, and introduced his fingers into the vagina, in order to ascertain the fact. His fingers were stopped by a tumour, as large as a child's head. The swelling occupied the back part of this passage, and descended as low as the perinæum. Being certain, that the uterus was displaced, he attempted to reduce it. The patient was put into various positions, and the fingers of one hand were introduced into the vagina, while those of the other were passed into the rectum. The use of the catheter was not forgotten; but, it could not be introduced far enough to reach the urine. Glysters were stopped at the very beginning of the rectum. The abdomen was exceedingly tense, especially, in the hypogastric region. A proposal was made to puncture the bladder; but, the patient refused to submit, and preferred being left to her fate. On the seventh day of her illness, she was very much reduced; and became affected with nausea, and hiccough, the forerunners of the mortification, which was about to happen. At length, she felt something give way in her abdomen, and, the ease, which succeeded, revived her hopes. These, however, were not of long duration; for, after being delivered of the fœtus, she sunk and died the next morning. On opening the body, the bladder was found to have sloughed and burst at several points, and two pints of urine were consequently extravasated in the abdomen.

We may conclude, from what has been stated, that the retroversio uteri is an exceedingly dangerous affection. However, it is not invariably fatal, particularly, when the patient receives succour, before the disorder has made much progress. It only occurs in the early months of pregnancy, and in women, whose pelvis is very wide, while its brim is very contracted. If the uterus, which occupies a pelvis of this conformation, should be pushed back by a distended state of the bladder, and pressed against the sacrum, while the soft parts yield, the viscus, in question, becomes, as it were, wedged, and is incapable of changing its position. In this immoveable state, it presses upon the surrounding parts, and these upon it, so that a very serious train of bad symptoms are the consequence.

The first care of a practitioner, consulted in a case of retroversio uteri, should be to empty the bladder and large intestines, and to relax the parts by every possible means. Then, he should immediately proceed to replace the uterus, by placing the patient in a suitable posture, and making methodical pressure in the rectum and vagina. Should he be so fortunate as to succeed, the patient is to be kept in bed, her bowels are to be kept open, and she is to be advised always to obey the calls of nature the first moment she feels

any inclination to make water. She is also to be enjoined to avoid all kinds of exertion, and wait, till the gradual enlargement of the uterus removes the possibility of this viscus descending into the pelvis. (*Sabatier, Médecine Opératoire, Tom.* 2.)

UVA URSI. The author of the Pharmacopœia Chir. remarks, that this plant, which was first brought into notice by De Haen, has been generally considered as a powerful remedy in calculus; but that it has not been proved, in any instance, to possess the properties of a solvent. The late Dr. Austin, however, recommended it upon the principle of its lessening the irritability of the bladder, and diminishing that secretion of diseased mucus, which, he supposed, greatly to contribute to the augmentation of the stone.

Mr. Bell, of Edinburgh, strongly recommends it in that state of a gonorrhœa where the irritability of the bladder is excited in a high degree, and where the urine is loaded with a viscid matter. In these cases, he directs the powder to be given in doses of a scruple or half a dram, three times a day. A remedy of this sort is certainly a great desideratum in surgery.

Dr. Saunders directs three drams of uva ursi to be macerated in a pint of hot water, and two or three ounces of the strained liquor to be given three times a day. (*Pharm. Chirurg.*)

UVULA, AMPUTATION OF. The uvula is subject to several kinds of enlargement, in which it becomes longer and more bulky, than natural, or in which it merely has its length increased. In consequence of such changes, it acts as an impediment to swallowing, and speaking, or else causes a disagreeable tickling at the root of the tongue, with which it comes into contact, and thus it may excite frequent retchings, and an annoying cough.

When things have attained this state, medicines are often ineffectual, and the only plan of relief consists in amputating a portion of the uvula, a very simple operation, which has been advised to be done in various ways.

The ancients recommended taking hold of the uvula with a pair of forceps, and cutting off the piece below the blades of the instrument. Celsus remarks: *Neque quidquam commodius est quàm vosella apprehendere, sub eaque, quod volumus, excindere.* Fabricius ab Aquapendente objects to this method of operating, on the ground, that it is necessary to employ both hands, so that there is a necessity for the aid of a third for holding the tongue and lower jaw. He prefers employing scissars, and thus to leave the left hand at liberty. When the uvula had been cut off, he advised a heated spoon to be applied to the cut end of the part, with a view of stopping the bleeding.

Paré speaks in favour of the method, advised by Celsus. When the size of the uvula is considerable, and there is reason to fear, that the vessels will bleed freely, he recommends it to be tied with a ligature, by means of an instrument, invented by Castellan, a physician distinguished in his time, both by his learning and judgment. The instrument in question consists of a ring, with a groove on its convexity, which ring is mounted on a slender handle. A ligature is put round the ring with a slip-knot, which is to be tightened by means of another ring, of much smaller size, mounted, like the preceding one, on a long slender handle. The ligature is to be left in the mouth, and, when it does not seem to make sufficient constriction, it is to be tightened.

Fabricius Hildanus has since described an instrument, constructed on the same principles, and applicable to the same purposes. Scultetus made use of the latter on a soldier, whose uvula was affected with the venereal disease. This author does not state, however, whether the ligature, which was applied in this way, was painful, productive of considerable inflammation, or whether the patient suffered much inconvenience from the presence of the ligature. Such effects were probably produced.

Heister, in plate 21, has given the engraving of an instrument, which was invented by a Norwegian peasant, in whose country a relaxed state of the uvula is a very common affection. The contrivance was perfected by Raw. It is only necessary for me to state, that it is a kind of knife, concealed in a sheath. At the end of this last part, when the blade is drawn back, a notch is left, in which the uvula is to be engaged, and then divided by pushing forward the knife.

Sabatier's plan of cutting off a portion of the uvula, is performed in a way very similar to the one described by Celsus. After having placed the patient on a high chair, and in a good light, with his head properly supported, he takes hold of the uvula with a pair of forceps, with holes in the blades, like those used for the extraction of polypi from the nose. He then divides the uvula with a pair of scissars, made with concave cutting edges, like the scissars recommended by Levret for dividing the umbilical cord. As the uvula is rendered tense with the forceps, perhaps, any other kind of scissars would answer equally well; but, Sabatier states, that those, which he uses, have the advantages of taking hold of a larger piece of the uvula, and of not letting it slip away.

The perforated forceps also take better

hold of the part, than common ones do, from which it is apt to slip. Sabatier observes, that he has never seen any bleeding of consequence follow the trivial operation just described. (See *Médecine Opératoire, Tom.* 3.)

In the *First Lines of the Practice of Surgery* will be found an engraving of a pair of scissars, which seem well calculated for cutting off portions of the uvula, as they have at the end of one of their blades a transverse piece, which prevents the part, about to be cut, from slipping away.

V.

VACCINATION. The practice of inoculating with cow-pox matter, or lymph, for the purpose of rendering the inoculated subject insusceptible of the effects of the small-pox contagion.

VAGINA IMPERFORATE. It is very common to meet with female infants, born with different kinds of imperforations of the vagina. Sometimes, this passage is not completely shut up, so that the usual evacuations happen in an uninterrupted manner, and it is a considerable time before the malformation is discovered. Doubtless, there has often been occasion to obviate the defect in question, in order to qualify young women for marriage. Some females have certainly become pregnant, notwithstanding the sort of obstruction alluded to, and, in these cases, the membrane, which shuts up a part of the mouth of the vagina, has either been torn by the effects of labour, or been divided as much as was necessary for promoting this process of nature.

What is more curious, is, that there should have been found two membranes, one placed beyond the other, and obstructing the vagina. That, which is commonly met with, is nothing more than the hymen, which is thicker, and stronger, than natural. Ruysch relates, that a woman, who had been in labour three days, could not be delivered. The head presented itself; but, was prevented from coming out by the hymen, which shut up the vagina, and was very tense. Ruysch made an incision into the membrane; but, to no purpose, since there was another membrane, of a thicker texture, and situated more deeply in the passage, hindering the delivery of the child. On an incision being made into this second membrane, the child was expelled, and the case ended well.

When the vagina is completely imperforate, as soon as the time of the menses commences, a great many complaints occur, which afflict the patient with more severity, in proportion as the blood accumulates in the passage, and they may even lead to a fatal termination, when the cause is not understood, or not detected till it is too late. The complaints alluded to, are very similar to those of pregnancy; for instance, rumbling noises in the bowels, loss of appetite, nausea, vomiting, enlargement of the mammæ, spasms, convulsions, swelling of the abdomen, &c. Hence, girls, in this situation, have often been supposed to be pregnant, although they were not in a state even to become so; and some young women have been known to die, after suffering the most afflicting symptoms.

When the only malformation consists in the orifice of the vagina being shut up by a membrane, the patient may be easily relieved by a crucial incision, or a single cut, the edges of which are kept apart by a tent of suitable shape and size. Instances of the success of such an operation are to be found in numerous writers. Fabricius ab Aquapendente informs us, that a female child was born with a membrane, which completely shut up the vagina. The girl experienced no inconvenience from it, till she was about thirteen years of age, when the period of her menses began. As the blood was retained, she became afflicted with more severe pains in the loins, the lower part of the abdomen, and about the upper part of the thighs. It was supposed, that she was attacked by the sciatic gout, and she was treated accordingly. Notwithstanding the medicines, which were prescribed, she became hectic, and reduced to a complete state of marasmus, in which she passed restless nights, had lost her appetite, and was delirious. A painful, very elastic tumour afterwards took place in that part of the abdomen corresponding to the uterus. The pains were aggravated every month, at the period, when the patient ought to have menstruated. She was in a dying condition, when Fabricius ab Aquapendente was consulted, who, after ascertaining the real nature of the case, performed

the requisite operation. A prodigious quantity of black putrid blood was discharged from the vagina; the bad symptoms gradually subsided, and the patient recovered.

It is not always equally easy to cure the imperforate vagina, when the malformation is produced by an extensive accretion of the sides of this passage to each other. The success of the operation is more doubtful, because, it is impossible to reach the situation of the blood without cutting through a considerable thickness of parts, in doing which there is some danger of wounding the rectum, or bladder. A lady, twenty-four years of age, after having tried, for eight years, such remedies as seemed best calculated for exciting the menstrual discharge, became affected with a large hard swelling of the abdomen, and a kind of herpetic affection round the body near the navel. At length, it was discovered, that the imperforation of the vagina was the sole cause of all the bad symptoms, which the patient had long endured. An incision was made, which enabled the operator to introduce his finger into a large cavity, and which gave vent to a considerable quantity of blood. It was thought, that an opening had been made into the vagina; but, the patient having died three days afterwards, it was seen, that a mistake had been made, as the cavity, in which the finger had been introduced, was that of the bladder. The vagina was closed below by a substance an inch in diameter, and half an inch thick. The upper part of this passage, the uterus, and the Fallopian tubes, were exceedingly enlarged, and filled with a dark-brown, sanious fluid. A similar fluid was found extravasated in the abdomen, and, it was discovered to have got there through a rupture, which had taken place in the Fallopian tube. The ovaries were in a natural state. De Haen, who has related this case in the sixth part of his work, intitled *Ratio Medendi*, was of opinion, that, in order to avoid opening the rectum, or bladder, only one oblique cut should be made in the membrane, which stops up the vagina, just as was advised, by Méeckren. (*Sabatier de la Médecine Opératoire, Tom.* 1.)

VAGINA, PROLAPSUS, OR INVERSION OF. This affection may take place in various degrees. The prolapsed part does not consist of all the coats of the vagina, in the manner that the inverted uterus is formed of the whole substance of that viscus, which becomes turned inside out. The inner lining of the vagina is alone displaced, in consequence of the swelling, and thickening, with which it is affected. The inversion of the vagina appears like a thick, circular substance, irregularly pleated in the middle, and at the bottom of which the cervex uteri is situated, having descended further down, than natural. The prolapsed portion of the vagina increases, or diminishes, according as the patient sits up, or keeps in bed a certain time. The complaint is accompanied by a sense of heaviness in the hypogastric region; tenesmus; and a difficulty of making water, in consequence of the alteration produced in the direction of the meatus urinarius.

Such is the prolapsus of the vagina in an early state; but, when it has been of long standing, and the patients have remained, for a long while, without any assistance, the membranous lining of the passage becomes more and more thickened; the tumour, which it forms, becomes more considerable, elongated, and hardened. In this state, there still continues at the lower part of the swelling, an opening, out of which the usual evacuations are made. The grievances, which patients suffer, are similar to those arising from a prolapsus uteri, to which, indeed, the present case bears a great resemblance. The prolapsus vaginæ, however, differs, inasmuch as the tumour, formed by a descent of the uterus is very firm, and terminates in a narrow end, on which may be observed the longish transverse opening, named the os tincæ, while the tumour, arising from a prolapsus of the vagina, is soft, thicker below, than elsewhere, and ends in an irregular aperture.

When the prolapsus vaginæ is recent, the part may be easily reduced, and kept up with a pessary; but, when the case has been of long standing, it is neither easy to effect the reduction, nor to prevent a recurrence of the disorder. Softening, relaxing remedies, in this circumstance, are recommended, and the patient should, in particular, confine herself to her bed, and wear a T bandage, which should be made to press upon and support a piece of sponge in the orifice of the vagina.

The swelling of the membranous lining of this passage, being folded back on itself, increases in such a degree, that the tumour, thus occasioned, falls into a state of mortification. In this event, some writers have advised the extirpation of the swelling, justifying the practice, on the authority of some distinguished practitioners, and the little danger, attendant on the operation.

Even Sabatier only objects to this proceeding, on the ground of the danger of mistaking a prolapsus of the uterus, for one of the vagina. However, no modern surgeons in this country would hesi-

tate about rejecting such an operation, and leaving the sloughs to separate of themselves.

VARICOCE'LE. (from *varix*, a distended vein, and κηλη, a tumour.) Many writers mean by the term *varicocele*, a varicose enlargement of the spermatic veins, which latter affection, we have, with Celsus and Pott, treated of under the name of *Cirsocele*.

Pott remarks, that the varicocele (which is an enlargement and distention of the blood-vessels of the scrotum) is very seldom an original disease, independent of any other, and, when it is, is hardly an object of surgery. The blood-vessels of the scrotum are of different size in different people; and like the vessels in other parts of the body, are liable to become varicose; but, they are seldom so much enlarged, as to be troublesome, unless such enlargement is the consequence of a disease, either of the testicle, or spermatic chord. When this is the case, the original disease is what engages our attention, and not this simple effect of it; and, therefore, considered abstractedly, the varicocele is a disease of no importance. (*Pott's Chirurgical Works, Vol.* 2.)

VARI'CULA. (dim. of *varus*, a dilated vein.) A varicose enlargement of the blood-vessels of the tunica conjunctiva of the eye.

VA'RIX. (from *varius*, unequal.) The term *varices* is applied to a kind of knotty, unequal, dark-coloured swellings, arising from a dilatation of different parts of the veins. Varices most frequently occur in the feet, near the ankles, and, sometimes, higher up, in the legs, thighs, and other parts, as, for instance, the scrotum, and even the abdomen, as Celsus has accurately remarked. Pregnancy is one of the most common causes of varicose veins. The disease, however, may be occasioned by the pressure of other swellings, besides that of the gravid uterus; it may also be produced by leading too sedentary a life, and, in short, by every kind of cause, capable of retarding the return of the blood, through the veins, towards the heart. The larger the diseased vessels become, the more painful and troublesome they are, in consequence of the great distention of their coats. Sometimes, they even burst, and emit a considerable quantity of blood; while, in other instances, they give rise to very obstinate ulcers. When the affected veins are not of large size, they seldom cause any very serious inconveniences. Hence, patients commonly make no complaint, and the neglect of the case gives it an opportunity to acquire an aggravated form.

When varicose veins are in a painful state, the patient (if other circumstances do not forbid) should be bled, and be put on a cooling regimen. A roller should also be applied with due tightness, and its employment continued for a considerable time.

Celsus informs us, that the ancients used to relieve patients, afflicted with varicose veins, by the actual cautery, or an incision. The first is a very objectionable method; and the latter is seldom necessary, except as formerly described by Paré, and latterly by Mr. Home, in particular cases of ulcers on the legs. (See *Ulcers*.) However, some writers are of opinion, that, when the varicose veins are exceedingly painful, and likely to burst, it is best to make a longitudinal opening into the largest of them with a lancet, in order to give vent to a certain quantity of blood, proportioned to the patient's strength, and, they advise a compress and bandage to be afterwards applied.

Dionis assures us, that he did not know any better means of compressing varicose veins, than buskins, made of dog-leather, and so contrived as to be laced on the part, with the requisite degree of tightness. Thus the leg might be compressed in an equal, regular way, without any occasion for removing the pressure at night. Since the time of Dionis, laced stockings have been very commonly and usefully employed for the cure of varices, situated in the leg.

Some have spoken in favour of applying astringent applications to varicose veins, as, for instance, compresses dipped in vinegar. But, though such remedies, perhaps, ought not to be altogether rejected as useless, little dependence can be put on them, unless they are employed in conjunction with compression, which, in the majority of cases, has of itself much greater effect, than any other plan, provided it is methodically made, and duly maintained. For this purpose a laced-stocking is certainly better, than any kind of roller.

For an account of the method of curing a particular sore on the leg, depending on varicose veins, see *Ulcer*. For a description of the varicose affection of the veins of the rectum, see *Hemorrhoids*.

VARI. Persons born with their feet deformed and turned inward are so termed.

VALGI, on the contrary, was used to express subjects born with their feet deformed and turned outward, which is a less frequent case.

VENEREAL DISEASE. (*Lues Venerea. Morbus Gallicus. Syphilis*, or *Siphilis*.) About the year 1494, or 1495, the venereal disease is said to have made its first appearance in Europe. Some wri-

ters are of opinion, that the distemper originally broke out at the siege of Naples; but, most of them have supposed, that, as Columbus returned from his first expedition to the West Indies, about the above period, his followers brought the disorder with them from the new to the old world. Other authors, among whom is Mr. B. Bell, maintain the opinion, that many arguments might be adduced to shew, that the venereal disease was well known in the old continent, and that it prevailed among the Jews, Greeks, and Romans, and their descendants, long before the discovery of America.

Marcellus Cumanus, Johannes de Vigo, and other early writers on the lues venerea, have left an account of some of the symptoms, and their description, as far as it extends, is found to agree with the appearances, observed even at the present day. Marcellus remarks: "I observed many of the officers and foot soldiers in Milan, while I was in the camp at Navarre, to have several scabs, or pustules, breaking out on the face, and spreading all over the rest of their bodies. The first of which appeared usually under the præputium, or on the outside, like a grain of millet, sometimes behind the glans, with a small itching. At other times, a single pustule would arise, like a little bladder, without much pain, but, itching also. If rubbed, or scratched, there arose an ulcer, corrosive, and smarting, like the sting of an ant," &c. (Vide *Astruc, Vol. 2, p. 226, translated by Dr. Barrowby.*)

Johannes de Vigo notices the way in which the disease is communicated by a chancre, in a still more particular and accurate manner: "*ejus origo in partibus genitalibus, viz. in vulvâ in mulieribus, et in virgâ in hominibus, semper ferè fuit cum pustulis parvis, interdum lividi coloris, aliquando nigri, nonnunquam subalbidi cum callositate eas circumdante.*" De Morbo Gallico. These quotations shew, that the venereal disease was propagated from the beginning, as it now is, by what the old writers called a *pustule*, and we name a *chancre*.

The venereal disease arises from a morbid poison, which, when applied to the human body, has the power of propagating, or multiplying itself, and is capable of acting both locally and constitutionally. It may also be communicated to other persons, in all the various ways, in which it is received, producing, as Mr. Hunter remarks, the same disease in some one of its forms.

The same celebrated writer notices, that, in whatever manner the venereal poison arose, it certainly began in the human race, as no other animal seems capable of being affected by it. The parts of generation were, probably, also, the first affected; for, if the disease had taken place in any other part of the body, in all probability, it would never have gone further, than the person, in whom it first arose. However, since it was situated in the parts of generation, where the only natural connexion takes place, between one human being and another, except that between the mother and child, it was in the most favourable situation for being propagated; and Mr. Hunter infers, also, that the first effects of the disease must have been local, in consequence of the fact, now well established, that none of the constitutional effects are communicable to other persons.

The particular properties of the venereal poison are quite unknown, its effects on the human body being the only information, which we possess concerning it. Mr. Hunter says, that it is commonly in the form of pus, or mixed with pus, or some other secretion. The virus excites, in most cases, an inflammation in the parts contaminated, which inflammation is attended with a specific mode of action, which is different from all other actions attending inflammation, and, according to Mr. Hunter, produces the specific quality in the matter.

The formation of matter, though a very general, is not a very constant attendant on this disease; for, inflammation, produced by the venereal poison, sometimes does not terminate in suppuration. But, if Mr. Hunter's sentiments are correct, it is the matter produced, whether with, or without inflammation, which alone contains the poison. Hence, a person, having the venereal irritation in any form, not attended with a discharge, cannot communicate the disease to another. In proof of this doctrine, the above-mentioned distinguished writer states, that, though married men often contract the disease, and continue to cohabit with their wives, even for weeks, yet, in the whole of his practice, he never once found, that the complaint was communicated under such circumstances, except when connexion had been continued, after the discharge had appeared.

It is possible to conceive, that the venereal poison may be in so diluted a state, that it would be incapable of exciting any degree of irritation, and, consequently, that no effects would be produced. However, when the poison has the power of irritating the part, to which it is applied, the same consequences will follow, whether from a large, or small quantity; from a strong, or weak solution.

The same matter, however, may affect different persons very differently. Two men sometimes have connexion with the same woman; both catch the disease; but, one may have very severe symptoms;

the other exceedingly mild ones. Mr. Hunter adds, that he has known one man give the disease to different women, and some of the women have had it with great severity, while others have suffered very slightly.

It is a great contested question, in the subject of the venereal disease, whether this malady and gonorrhœa arise from the same poison? Mr. Hunter acknowledges, that the opinion, of their originating from two distinct poisons, seems to have some foundation, when we consider the difference in the symptoms, and method of cure. But, the same author contends, that, if we take up this question upon other grounds, and, also, have recourse to experiments, the result of which we can also safely depend upon, we shall find this notion to be erroneous. I shall not repeat, in this place, the arguments, adduced by Hunter in support of the doctrine, that both diseases are produced by the same virus: the reader will find some notice taken of them in the article *Gonorrhœa*.

Mr. B. Bell, and several other writers, have supported an opinion, contrary to the one, set forth by John Hunter, relative to the poison, from which lues venerea, and gonorrhœa arise, and, indeed, after impartially considering the evidence brought forward by the two opposite parties, I feel much inclined to believe, that the two diseases do not originate from the same virus. Mr. Hunter, it is true, has brought forward some observations tending to shew, that, a chancre and other venereal symptoms, following absorption from such chancre, might be communicated by inoculating a person with the matter of a gonorrhœa. However, in speaking of *gonorrhœa*, I have suggested some reasons for not placing implicit belief in the inferences, which Mr. Hunter has drawn.

Mr. B. Bell adduces some facts, from which an almost decisive conclusion may be made, that the poisons of the venereal disease, and the gonorrhœa, are entirely different and distinct. Mr. Bell observes, that, on a subject such as this, the names of persons, by whom the following experiments were conducted, cannot be mentioned; but, he is personally acquainted with all of them, and he believes his friend, Dr. Duncan, saw the progress of some of the cases. Mr. Bell knows, that all, which they relate, may be with certainty relied on, and he explains, what was done, in nearly their own words.

One gentleman states: "My experiments were made a good many years ago, and were meant to form the subject of a paper for a medical society, of which I am a member. I had no theory to support, nor any other view in making them, than to support the opinion, at that time generally received among practitioners, namely, that lues venerea and gonorrhœa virulenta, are one and the same disease, arising from the same matter of contagion, acting in a different manner on different surfaces. I was soon, however, convinced, by the very distressful and unexpected event of my experiments of the fallacy of this opinion.

"Matter was taken upon the point of a probe, from a chancre on the glans penis, before any application was made to it, and completely introduced into the urethra, expecting thereby to produce a gonorrhœa. For the first eight days, I felt no kind of uneasiness; but, about this period, I was attacked with pain in passing my water. On dilating the urethra, as much as possible, nearly the whole of a large chancre was discovered, and, in a few days thereafter, a bubo formed in each groin. No discharge took place from the urethra, during the whole course of the disease; but another chancre was soon perceived in the opposite side of the urethra, and red precipitate was applied to it, as well as to the other, by means of a probe previously moistened for the purpose. Mercurial ointment was at the same time rubbed on the outside of each thigh, by which a profuse salivation was excited. The buboes, which, till then, had continued to increase, became stationary, and, at last, disappeared entirely; the chancres became clean, and, by a due continuance of mercury, a complete cure was at last obtained."

Mr. B. Bell informs us, that the next experiment was made with the matter of gonorrhœa; a portion of which was introduced between the prepuce and glans, and allowed to remain there without being disturbed. In the course of the second day, a slight degree of inflammation was produced, succeeded by a discharge of matter, which, in the course of two or three days, disappeared.

The same experiment was, by the same gentleman, repeated once and again, after rendering the parts tender, to which the matter of gonorrhœa was applied; but, no chancre ever ensued from it.

Mr. B. Bell also acquaints us, that two young gentlemen, while prosecuting the study of medicine, became anxious to ascertain the point in question; with which view, they resolved on making the following experiments, at a time, when neither of them had ever laboured under either gonorrhœa, or syphilis, and both in these and in the preceding experiments, the matter of infection was taken from patients, who had never made use of mercury.

A small dossil of lint, soaked in the matter of gonorrhœa, was, by each of them inserted between the prepuce and

the glans, and allowed to remain on the same spot for the space of twenty-four hours. From this, they expected, that chancres would be produced; but, in the one, a very severe degree of inflammation ensued over the whole glans and præputium, giving all the appearance of, what is usually termed, *gonorrhœa spuria*. A considerable quantity of fetid matter was discharged from the surface of the inflamed parts, and, for several days, he had reason to fear, that an operation would be necessary for the removal of a paraphymosis. By the use of saturnine poultices, laxatives, and low diet, however, the inflammation abated, the discharge ceased, no chancre took place, and he soon got entirely well.

The other gentleman, says Mr. B. Bell, was not so fortunate. The external inflammation, indeed, was slight, but, by the matter finding access to the urethra, he was attacked, on the second day with a severe degree of gonorrhœa, which continued for a considerable time to give him a great deal of distress, nor did he, for upwards of a year, get entirely free of it.

The latter gentleman, impressed with a sense of the imprudence and hazard of all such experiments, could not be prevailed upon to carry them further, although they were prosecuted by his friend. This young man, soon after the inflammation, arising from his first experiment, had been removed, inserted the matter of gonorrhœa on the point of a lancet, beneath the skin of the præputium, and, likewise, into the substance of the glans; but, although this was repeated three different times no chancres ensued. A slight degree of inflammation was excited; but, it soon disappeared, without any thing being done for it. His last experiment was attended with more serious consequences. The matter of a chancre was inserted on the point of a probe to the depth of a quarter of an inch, or more, in the urethra. No symptoms of gonorrhœa ensued; but, in the course of five, or six days, a painful inflammatory chancre was perceived on the spot, to which the matter was applied. To this succeeded a bubo, which ended in suppuration, notwithstanding the immediate application of mercury, and the sore, that was produced, proved both painful and tedious. Ulcers were at last perceived in the throat, nor was a cure obtained, till a very large quantity of mercury was given under a state of close confinement for thirteen weeks. (*Treatise on Gonorrhœa Virulenta and Lues Venerea, Vol. 1, Edit. 2, p. 438, &c.*

Some have supposed that the poisonous quality of venereal matter arises from a fermentation taking place in it as soon as it is formed. However, Mr. Hunter conceives, that the animal body has a power of producing matter according to the irritation given, whereby the living powers, whenever irritated in a particular manner, produce such an action in the parts, as to generate a matter, similar in quality to that which excited the action.

It does not seem necessary to adduce the arguments, by which the idea of fermentation being concerned in the production of the venereal virus might be refuted, as no modern practitioner now defends the doctrine. Mr. Hunter was of opinion, that the effects, produced by the venereal poison, arise from its peculiar, or specific irritation, joined with the aptness of the living principle to be irritated by such a cause, and the parts, so irritated, acting accordingly. Hence, he considered, that the venereal virus irritated the living parts in a manner peculiar to itself, and produced an inflammation, peculiar to that irritation, from which a matter is produced, peculiar to the inflammation.

The venereal poison is capable of affecting the human body in two different ways; locally, that is, in those parts only, to which it is first applied; and, constitutionally, that is, in consequence of the absorption of the venereal pus, which affects parts, while it is diffused in the circulation.

Though Mr. Hunter uses the term constitutional, he explains in a note, that the word is not altogether correctly applied, as every complaint of a venereal nature is truly local, and produced by the simple application of the poison to the parts. The latter circumstance may happen, either by the immediate contact of the matter with the skin, before any absorption has taken place, or it may happen by the matter coming into contact with such parts, as are susceptible of the venereal disease, after absorption has taken place, and while the virus is circulating in the system.

Mr. Hunter believed, as the reader already understands, that gonorrhœa was only one form of the venereal disease. In gonorrhœa, he observes, there is a formation of matter without a breach in the solids, while, on the contrary, a chancre is attended with a breach of this kind; and, he imputed the two different ways, in which the disorder appears, not to any thing peculiar in the kind of poison applied, but, to the difference in the parts contaminated. When the poison was applied to a secreting surface, which had no cuticle, he believed, that, it never produced ulceration, but, only an alteration in the quality of the secretion. Thus, in the urethra, instead of mucus, pus became secreted, and a gonorrhœa arose. On the other hand, Mr. Hunter

thought, that, when the virus was applied to a surface, that is covered with a common cuticle, as the common skin of the body, ulceration would be the effect. In this manner, he accounts for the same poison producing two such different consequences, as gonorrhœa, and chancre.

OF CHANCRES.

From the account, already delivered, that the venereal disease can only be imparted from one person to another by the actual contact of the matter, it must be obvious, that the first effects of the disorder must in general make their appearance on the parts of generation, in consequence of the virus being applied to them during coition.

Mr. Hunter reminds us, however, that the penis, which in men, is the common seat of a chancre, is, like every other part of the body, liable to diseases of the ulcerative kind, and that, on account of some circumstances, it is rather more so than other parts. When attention is not paid to cleanliness, excoriations, or superficial ulcers often originate in consequence of such neglect. The genitals, also, like almost every other part that has been injured, when once they have suffered from the venereal disease, are very liable to ulcerate again. Since, therefore, the penis is not exempted from the common diseases of the body, Mr. Hunter very properly remarks, that an opinion, concerning ulcers situated on it, must be formed with great attention, particularly, as every disease in this part is suspected to be venereal.

"Venereal ulcers (says Mr. Hunter) commonly have one character, which, however, is not entirely peculiar to them; for, many sores, that have no disposition to heal, (which is the case with a chancre) have so far the same character. A chancre has commonly a thickened base, and, although, in some, the common inflammation spreads much further, yet the specific is confined to this base." (P. 215.)

Mr. Hunter notices, that there are three ways, in which chancres may be produced; first, by the poison being inserted into a wound; secondly, by being applied to a non-secreting surface; and, thirdly, by being applied to a common sore. To whichever of these three different surfaces it is applied, the pus produces its specific inflammation and ulceration, attended with a secretion of pus. The matter produced, in consequence of these different modes of application, partakes of the same nature, as the matter, which was applied, because, as Mr. Hunter observes, the irritations are alike.

Mr. Hunter takes notice, that the poison much more readily contaminates, when it is applied to a fresh wound, than to an ulcer.

Though chancres commonly occur on the parts of generation, this circumstance is entirely owing to their being the only parts, with which the virus ever comes into contact, the application being made during the connexion between the sexes. Every part of the body may be affected by the application of venereal matter to it, particularly, when the cuticle is thin. Mr. Hunter mentions, his having seen on the red part of the lip a chancre, which was as broad as a sixpence. The venereal virus had most probably been inadvertently applied to the part by the patient's own fingers. Mr. Hunter had not the least doubt of the sore being really a chancre; for, besides its diseased appearance, it was attended with a bubo in one of the glands under the lower jaw.

Chancres have occasionally occurred on the fingers, particularly, when there has been any previous cut, or scratch on these parts, and they have been employed in this state in dressing venereal sores.

Mr. Hunter computed, that claps occur more frequently, than chancres, in the proportion of four, or five to one. As this celebrated writer conceived, that both these diseases originated from the same virus, which only produced different effects by its having to act on a secreting, or non-secreting surface, he attempts to explain the less frequent occurrence of chancres by the operation of the venereal poison, being often prevented by the intervention of the cuticle.

The same author states, that, in men, chancres generally make their appearance on the frænum, glans penis, prepuce, or on the common skin of the body of the penis; and, sometimes, on the fore part of the scrotum; but, he thought, that such sores took place most frequently on the frænum, and in the angle, between the penis and glans. He refers the cause of the venereal poison affecting these parts to the manner, in which the disease is caught, and not to any specific tendency in these parts to catch the complaint; and he imputes the circumstance of the frænum being more frequently affected, than other parts of the penis, to the external form of that part being irregular, and allowing the venereal matter to lie undisturbed in its folds. Thus the virus has time to irritate, and inflame the parts, and to produce the suppurative and ulcerative inflammation in them.

Mr. Hunter next observes, that the interval, between the application of the poison, and its effects upon the parts, is uncertain; but, that, on the whole, a chancre is longer in appearing, than a

gonorrhœa. However, the nature of the parts affected makes some difference. When a chancre occurs on the frænum, or at the termination of the prepuce, in the glans, the disease in general comes on earlier; these parts being more easily affected, than either the glans penis, common skin of this organ, or the scrotum.

Mr. Hunter adds, that, in some cases, in which both the glans and prepuce were contaminated from the same application of the poison, the chancre made its appearance earlier on the latter part.

Mr. Hunter states his having been acquainted with some instances, in which chancres appeared twenty-four hours after the application of the matter; and with others, in which an interval of seven weeks, and even two months elapsed, between the time of contamination and that, when the chancre commenced.

A chancre first begins with an itching in the part. When the inflammation is on the glans penis, a small pimple full of matter, generally arises, without much hardness, or seeming inflammation, and with very little tumefaction; for, the glans penis is not so apt to swell, in consequence of inflammation, as many other parts are, especially, the prepuce. Mr. Hunter also explains, that chancres, situated on the glans, are not attended with so much pain and inconvenience, as sores of this nature on the prepuce. When chancres occur on the frænum, or, particularly, on the prepuce, a much more considerable degree of inflammation soon follows, attended with effects, more extensive and visible. These latter parts, being composed of very loose cellular membrane, afford a ready passage for the extravasated fluids. The itching is gradually converted into pain; in some cases, the surface of the prepuce is excoriated, and afterwards ulcerates; while, in other examples, a small pimple or abscess appears, as on the glans, and then turns into an ulcer. The parts become affected with a thickening, which, at first, while of the true venereal kind, is very circumscribed; not diffusing itself, as Mr. Hunter observes, gradually and imperceptibly into the surrounding parts; but, terminating rather abruptly. Its base is hard, and the edges a little prominent. When it begins on the frænum, or, near it, that part is very commonly wholly destroyed, or a hole is often made through it by ulceration. Mr. Hunter thought it better, in general, under the latter circumstance, to divide the part at once.

When the venereal matter is applied to the body of the penis, or front of the scrotum, where the cuticle is thicker, than that of the glans penis and prepuce, the chancre generally makes its appearance in the form of a pimple, which commonly forms a scab, in consequence of evaporation. The first scab is generally rubbed off; after which a second, still larger, one is produced.

When the disease is more advanced, it is often attended with such inflammation as is peculiar to the habit, becoming in many instances more diffused, and often producing phymosis, and paraphymosis. However, says Mr. Hunter, there is yet a hardness, around the sores, which is peculiar to such as are caused by the venereal virus, particularly, those on the prepuce.

The local, or immediate effects of the venereal disease are seldom wholly specific; but, are usually attended both with the specific and constitutional inflammation. Hence, Mr. Hunter, advises particular attention to be paid to the manner, in which a chancre first appears, and to its progress. If the inflammation spreads in a quick and considerable way, the constitution must be more disposed to inflammation, than is natural. When the pain is severe, Mr. Hunter remarks, there is a strong disposition to irritation. Chancres also, sometimes, soon begin to slough, there being a strong tendency to mortification.

It is also observed by Mr. Hunter, that when there is a considerable loss of substance, either from sloughing, or ulceration, a profuse bleeding is no uncommon circumstance, more especially, when the ulcer is on the glans. The adhesive inflammation does not appear to take place sufficiently to unite the veins of this part of the penis, so as to prevent their cavity from being exposed, and the blood escapes from the corpus spongiosum urethræ. The ulcers, or sloughs, often extend as deeply as the corpus cavernosum penis, and similar bleedings are the consequence.

With respect to chancres in women, the labia and nymphæ, like the glans penis in men, are subject to ulceration, and the ulcerations are generally more numerous in females, than males, in consequence of the surface, on which the sores are liable to form, being much larger. As Mr. Hunter observes, chancres are occasionally situated on the edge of the labia; sometimes on the outside of these parts; and even on the perinæum. When the sores are formed on the inside of the labia or nymphæ, they can never dry, or scab; but, when they are externally situated, the matter may dry on them, and produce a scab, just as happens, with respect to chancres situated on the scrotum, or body of the penis.

Mr. Hunter remarks, that the venereal matter from these sores is very apt to run down the perinæum to the anus,

and excoriate the parts, especially, about the anus, where the skin is thin, and where chancres are liable to be thus occasioned.

Chancres have been noticed in the vagina; but, Mr. Hunter suspected, that they were not original ones; but, that they had spread to this situation from the inside of the labia.

Before any of the virus has been taken up by the absorbents, and conveyed into the circulation, a chancre is entirely a local affection.

TREATMENT OF CHANCRES.

It was one of Mr. Hunter's opinions, that the ulceration, arising from venereal inflammation, generally, if not always, continues, till cured by art, and his theoretical reason for this circumstance was, that, as the inflammation in the chancre spreads, it is always attacking new ground, so as to produce a succession of irritations, and hinder the disease from curing itself.

We have already noticed, that chancres are not wholly venereal, but are attended with effects, dependent on constitutional peculiarities, to which the variety in the treatment must be adapted. The venereal symptoms, abstractedly considered, may be cured by mercury; but, the treatment of the symptoms, which depend on peculiarity of constitution, have no specific remedy, and demand different means in different cases.

Though the treatment of a chancre may be attempted both constitutionally and locally, it is commonly a considerable time before the sores appear to be affected by mercury. Sometimes the circulation must be loaded with mercury for three, or four weeks, or even longer, before a chancre begins to separate its discharge from its surface, so as to look red, and exhibit a living surface; but, says Mr. Hunter, when once it does change, its progress towards healing is more rapid. This author describes a chancre as being generally much longer in getting well, than the other local effects of the venereal disease, arising from the absorption of the poison into the constitution.

Mr. Hunter enjoins the practitioner to consider, also, whether weakening, strengthening, or quieting medicines, should be exhibited; sometimes, one kind; sometimes, another being proper.

Chancres (observes the same celebrated writer) admit of two modes of treatment. The object of one is to destroy or remove them by means of escharotics, or by extirpation. That of the other is to overcome the venereal irritation by means of the specific remedy for the syphilitic poison.

That chancres are local complaints, is confirmed by the circumstance of their admitting of being destroyed, or cured merely by local treatment. It has been a question, whether mercury should ever be locally applied to chancres, or not. On this subject, Mr. Hunter considers, that, in the cure of such sores, there are two objects to be aimed at; one is the cure of the chancre itself; the other is the prevention of a contamination of the habit.

The cure of the chancre is to be effected by mercury, applied either in external dressings, or, internally, through the circulation, or in both ways. The preservation of the constitution from contamination is to be accomplished, first by shortening the duration of the chancre, which shortens the opportunity for absorption; and also by internal medicine, which must be in proportion to the time, that the absorption may have been going on.

If, says Mr. Hunter, the power of a chancre to contaminate the constitution, or, what is the same thing, if the quantity of the virus absorbed is proportioned to the size of the chancre, and the time of absorption, which most probably it is, then whatever shortens the time, must diminish the above power, or the quantity of the poison absorbed. Also, if the quantity of mercury, necessary to preserve the constitution, is proportioned to the quantity of the virus absorbed, then whatever lessens the quantity absorbed, must proportionally preserve the constitution. For instance, says Mr. Hunter, if the power of a chancre to contaminate the constitution in four weeks is equal to four, and the quantity of mercury necessary to be given internally, both for the cure of the chancre and the preservation of the constitution, is also equal to four, then whatever shortens the duration of the chancre, must lessen in the same proportion the quantity of mercury necessary. Hence, if local applications, together with the internal use of mercury, will cure a chancre in three weeks, then it will only be necessary to exhibit three-fourths of the quantity of mercury internally. Mr. Hunter observes, therefore, that local applications, inasmuch as they tend to shorten the duration of a chancre, shorten the duration of absorption, and, in this manner, shorten the necessity for the continuance of an internal course of mercury, all in the same proportion. For example, if four ounces of mercurial ointment will cure a chancre and preserve the constitution in four weeks, three ounces will be sufficient to preserve the constitution, if the cure of the chancre can be, by any other means,

forwarded, so as to be effected in three weeks. Mr. Hunter affirms, that this is not speculation; but, the result of experience, and confirmed by the destruction of chancres.

DESTROYING CHANCRES.

Mr. Hunter notices, that the simplest method of treating a chancre is to destroy, or extirpate it, whereby it is reduced to the state of a common sore, or wound, and heals up as such. This can only be done on the first appearance of the chancre, when the surrounding parts are not yet contaminated; for, it is absolutely necessary to remove the whole of the diseased part, and this object is exceedingly difficult of accomplishment, when the disease has spread considerably. The plan may be effected either with the knife, or caustic. Mr. Hunter states, that, when the chancre is situated on the glans penis, touching the sore with the lunar caustic is preferable to cutting it away, because the hemorrhage from the cells of the glans would be considerable in the latter method.

The caustic will not give a great deal of pain, as the glans is not an exceedingly sensible part. The caustic employed should be pointed at the end, like a pencil, in order that it may only touch such parts as are really diseased. This treatment should be continued, till the surface of the sore looks red and healthy, after the separation of the last sloughs. When it has attained this condition, it will heal, like any other sore, made with caustic.

When the sore is on the prepuce, or the common skin of the penis, and, in an ineipient state, the same practice may be adopted with success. When the chancre is large, however, it cannot be destroyed with the argentum nitratum, which does not extirpate the increasing sore deeply enough. In such cases, Mr. Hunter thought, that the lapis septicus would answer very well. When the latter caustic cannot be conveniently employed, this author recommended the chancre to be cut away. He mentions his having taken out such a sore by dissection, and that the part afterwards healed with common dressings. However, says he, as our knowledge of the extent of the disease is not always certain; and as this uncertainty increases with the size of the chancre, the cure must be in some measure promoted by proper dressings, and, it will be prudent to dress the sore with mercurial ointment. When this plan is followed, Mr. Hunter believed, that there is but little danger of the constitution being infected, particularly, when the chancre has been destroyed almost immediately on its first appearance; for, then it is reasonable to conclude, that there has not been time for absorption to have taken place. But, observes the same author, as it must be in most cases uncertain, whether there has been absorption or not, this practice should not always be trusted to, and, perhaps, never should be relied in. Hence, even when the chancre has been destroyed in its incipient state, some mercury should be given from motives of prudence, the quantity of which medicine should be proportioned to the duration and progress of the sore. When the chancre is large, before it is extirpated, mercury is absolutely necessary, and Mr. Hunter conceived, that very little good is done by the extirpation.

LOCAL APPLICATIONS TO CHANCRES.

The cure of a chancre (says Mr. Hunter) is a different thing from its extirpation, and consists in destroying its venereal disposition, which object being effected, the parts heal of course, as far as they are venereal.

The employment of mercury, both as a topical application, and a constitutional remedy, is necessary in order to cure a chancre.

Mercurial ointments have been commonly used as dressings to chancres; but, Mr. Hunter was of opinion, that if the mercury were joined with watery substances, instead of oily ones, the application, by mixing with the matter, would be continued longer to the sore, and would prove more effectual. This, he observes, is one advantage, which poultices have over common dressings. He has often used mercury rubbed down with some conserve, instead of ointment, and it answered extremely well. Calomel used in the same way, and also the other preparations of mercury, mixed with mucilage, or honey, answer the same purpose. Such dressings, according to Mr. Hunter, will effect a cure, in cases, which are truly venereal, and free from other morbid tendencies.

Some chancres are indolent, and require a little warm balsam or red precipitate to be joined with the mercurial dressing. Mr. Hunter says, that calomel mixed with salve is more active, than common mercurial ointment, and is attended with better effects, when the case requires stimulants.

Solutions of blue vitriol, verdigrease, calomel, &c. have been recommended. But, Mr. Hunter very judiciously observes, that, as all these applications are only of service in remedying any peculiar disposition of the parts, as they have no specific power over the venereal poison,

and as such dispositions are innumerable, it is almost impossible to say, what applications will be effectual in every instance. Some kinds of dressings will answer in one state of the sore; some in another. The parts affected are often found extremely irritable, in which circumstance the mercury should be mixed with opium or preparations of lead.

Mr. Hunter was an advocate for changing the dressings, very often, because the matter separates them from the sore, so as to diminish their effects. He states, that changing the applications, thrice a day, will not be found too often, particularly, when they are in the form of an ointment.

When the venereal nature of a chancre is removed, the sore frequently becomes stationary, in which case Mr. Hunter observes, that new dispositions have been acquired, and the quantity of disease in the part has been increased. When chancres are only stationary, Mr. Hunter says, they may often be cured, by touching them slightly with the lunar caustic. No cicatrization, in this case, seems possible, till the contaminated surface, or the new flesh, which grows on that surface, has either been destroyed or altered.

It is often surprising, how quickly the sores heal up after being touched with the application. (See *Hunter on the Venereal Disease.*)

INTERNAL EXHIBITION OF MERCURY FOR CHANCRES.

At the same time that topical applications are made to chancres, mercury must be internally exhibited, both with a view of curing these ulcers, and preventing a lues venerea. Mr. Hunter believed, that the venereal disposition of the chancre would hardly ever withstand both local and internal mercurials.

When local applications cannot easily be made to chancres, as in cases of phymosis, there is a still greater necessity for giving mercury internally, by which means, the cure may in the end be effected.

Mercury should always be given internally in every case of chancre, let it be ever so slight, and even when the sore has been destroyed on its very first appearance. The remedy should always be exhibited the whole time of the cure, and continued for some time after the chancre has healed; for, says Mr. Hunter, as there are, perhaps, few chancres without absorption of the matter, it becomes absolutely necessary to give mercury to act internally, in order to hinder the venereal disposition from forming. How much mercury should be thrown into the constitution in the cure of a chancre, with a view of keeping the system from being affected, cannot easily be determined, as there is no disease actually formed, by which we can be guided. Mr. Hunter states, that the quantity must in general be proportioned to the size, number, and duration, of the chancres; or, in other words, proportioned to the opportunity, which there has been given for absorption.

The mercury, which is exhibited to act internally, may be conveyed into the system, either by the skin, or stomach, according to circumstances, and, it should be so taken, as to produce a slight affection of the mouth.

Mr. Hunter next remarks, that when the sore has put on an healthy look, when the hard basis has become soft, and the ulcer has skinned over in a favourable manner, it may be regarded as cured.

The same distinguished writer notices, however, that, in very large chancres, it may not always be necessary to continue the application of mercury, either for external, or internal action, till the sore is healed; for, the venereal action is just as soon destroyed in a large chancre, as it is in a small one, since every part of the sore is equally affected, by the medicine, and, of course, cured with equal expedition. But, in regard to cicatrization, circumstances are different, because a large sore is longer than a small one, in becoming covered with skin. Hence, Mr. Hunter very justly explains, that a large chancre may be deprived of its venereal action, long before it has healed; while, on the other hand, a small one may heal before the syphilitic affection has been destroyed. In the latter case, this gentleman represents it as most prudent, both on account of the chancre and constitution, to continue the employment of mercury, a little while after the sore has healed.

Mr. Hunter, in the valuable work, which he has left on the present subject, takes notice of sloughs, which occur in the tonsils, from the effect of mercury on the throat, and are apt to be mistaken for venereal complaints. He also mentions, that, sometimes, when the original chancre has been doing well, and been nearly healed, he has seen new sores break out on the prepuce, near the first, and assume all the appearance of chancres.

When, in the treatment of chancres, a bubo arises, while the constitution is loaded with a sufficient quantity of mercury to cure such sores, which medicine has also been rubbed into the lower extremity, on the same side as the bubo, Mr. Hunter suspects, that the swelling in the groin is not venereal, but is produced by the mercury. In these cases

he always preferred conveying mercury into the system in some other manner.

With respect to the treatment of chancres in women, since it is difficult to keep dressings on the parts, Mr. Hunter advises the sores to be frequently washed with some mercurial solution, and, speaks of one, made with corrosive sublimate, as perhaps being the best, since it will act as a specific, and stimulant also, when this is requisite. When the chancres however, are irritable, they are to be treated in the same manner, as similar complaints in men. When the sores extend into the vagina, this passage must be kept from becoming constricted, or closed, by the introduction of lint.

Sometimes, after a chancre and all venereal disease are cured, the prepuce continues thickened and elongated, so that the glans cannot be uncovered. Perhaps, the case is often without remedy. Mr. Hunter, however, very properly recommends trying every possible means, and he informs us, that the steam of warm water, hemlock fomentations, and cinnabar fumigations, are frequently of singular service.

When the thickening and enlargement of the prepuce cannot be removed by applications, all the portion, anterior to the glans penis, may be cut away. (See *Phymosis.*)

Mr. Hunter has very ably explained, that chancres, both in men and women, often acquire, during the treatment, new dispositions, which are of various kinds, some retarding the cure, and leaving the parts in an indolent thickened state, after the cure is accomplished. In other instances, a new disposition arises, which utterly prevents the parts from healing, and often produces a much worse disease, than that, from which it originated. Such new dispositions may lead to the growth of tumours. They are more frequent in men, than women, and generally occur only when the inflammation has been violent from some peculiarity of the parts, or constitution. They have sometimes been considered as cancerous.

Among the diseases in question, Mr. Hunter notices those continued, and often increased inflammations, suppurations, and ulcerations, which become diffused through the whole prepuce, and, also, along the common skin of the penis, which become of a purple hue, attended with such a general thickening of the cellular membrane, as makes the whole organ appear considerably enlarged. The same writer observes, that the ulceration on the inside of the prepuce will sometimes increase, and run between the skin and the body of the penis, and eat holes through in different places, till the whole is reduced to a number of ragged sores. The glans often shares the same fate, till more, or less of it is gone. Frequently, the urethra in this situation is wholly destroyed by ulceration, and the urine is discharged some way farther back. The ulceration, if unchecked, at length destroys all the parts. In this acute case, prompt relief is demanded; but, often the proper mode of treatment cannot be at once determined, owing to our ignorance, in respect to the exact nature of the peculiar cause of the disease. Mr. Hunter states, that the decoction of sarsaparilla is often of service, when given in large quantities, and that he has known the German diet drink effect a cure, after every other remedy had failed. The following diet drinks, he says, have been much recommended.

Take of crude antimony and pumice-stone, pulverized, and tied up in a bit of rag, of each one ounce; China root, sliced, sarsaparilla root, sliced and bruised, of each half an ounce; ten walnuts with their rinds bruised; spring-water, four pints; boiled to half that quantity; filter it, and let it be drunk daily in divided doses.

Take of sarsaparilla, Saunders-wood, white and red, of each three ounces; liquorice and mezereon, of each half an ounce; of lignum rhodium, guaiacum, sassafras, of each an ounce; crude antimony, two ounces; mix them and infuse them in boiling water, ten pints, for twenty-four hours; and, afterwards boil them to five pints, of which let the dose be from a pint and a half to four pints a day.

Mr. Hunter also states, that the extract of hemlock is sometimes of service, and that he has known sea-bathing effect a perfect cure.

Sometimes, when such sores are healing, it becomes necessary to keep the orifice of the urethra from closing, by the introduction of a bougie.

Sometimes, after a chancre has healed, the cicatrix breaks out again, and puts on the appearances of the preceding sore. Occasionally, similar diseases break out in different places from that of the cicatrix. Mr. Hunter represents, that they differ from a chancre in generally not spreading so fast, nor so far; in not being so painful, nor so much inflamed; in not having such hard bases, as venereal sores have; and in not producing buboes. This writer was of opinion, that they were not venereal. They are very apt to recur.

Mr. Hunter does not specify any particular mode of cure for all these cases; but, he mentions one instance, which seemed to be cured by giving forty drops of the lixivium saponarium, every evening and morning, in a basin of broth;

and he adverts to another case, which was permanently cured by sea-bathing.

In some instances, after a chancre has healed, the parts, as Mr. Hunter remarks, do not ulcerate; but, appear to become thickened, and indurated. Both the glans and prepuce seem to swell, so as to form on the end of the penis a tumour, or excrescence, shaped very much like a cauliflower, and, when cut into, shewing radii, running from its base, or origin, towards the external surface. It is extremely indolent. It is not always a consequence of the venereal disease; for, Mr. Hunter has seen it arise spontaneously.

No medicine seems to be at all likely to cure the disease: the only successful means is to amputate a considerable part of the penis, and then to keep a proper catheter introduced into the urethra.

WARTS.

Another disposition, induced by the previous occurrence of chancres, is a disposition to form excrescences, or cutaneous tumours, called warts. These are considered by many not simply as a consequence of the venereal poison; but, as possessed of its specific disposition, and, therefore, says Mr. Hunter, they have recourse to mercury for the cure of them; and, it is said, that such treatment often removes them. This eminent practitioner never saw mercury produce this effect, although the medicine was given in sufficient quantity to cure recent chancres, and a lues venerea, in the same person.

Mr. Hunter observes, that as these substances are excrescences from the body, they are not to be considered as truly a part of the animal, not being endowed with the common, or natural animal powers. Many trifling circumstances make them decay. An inflammation of the sound parts round the wart, or stimuli applied to its surface, will often make it die. Electricity will also induce an action in such excrescences, which they are not able to support; an inflammation is excited round them, and they drop off.

From this account, we must perceive, according to Mr. Hunter, that the knife and escharotics are not always necessary, although, these modes will act more quickly, than any other, especially, when the neck of the wart is small. When such is the form of the excrescence, perhaps, a pair of scissars is the best instrument; but, says the above distinguished writer, when cutting instruments of any kind are horrible to the patient, a silk-thread, tied round the neck of the wart, will do very well. However, whichever plan is adopted, it is in general necessary to touch with caustic the base of the little tumour, after this has separated.

Mr. Hunter remarks, that escharotics act upon warts in two different ways, namely, by deadening a part, and stimulating the remainder, so that, by the application of escharotic, after escharotic, the whole excrescence decays moderately fast; and it is seldom necessary to destroy them down to the very root, which is often thrown off. This however, is not always the case, and the wart grows again, in which circumstance, it is proper to let the caustic destroy even the root itself.

The kali purum cum calce vivâ, lunar caustic, and blue vitriol, are all proper applications. But, one of the best stimulants is the ærugo æris and powder of savin leaves, mixed together. (*Hunter on the Venereal Disease.*)

BUBOES.

The immediate consequence of a chancre, which is called a bubo, and also the remote effects, implied by the term, *lues venerea*, arise from the absorption of recent venereal matter from some surface, where it has either been applied or formed.

We are already aware, that Mr. Hunter believed the matter of gonorrhœa capable of communicating the venereal disease. Hence, he explains in the following terms, the three ways, in which he thought a bubo might arise in consequence of absorption. He observes, that the first and most simple manner, is when the matter, either of a gonorrhœa, or chancre, has only been applied to some sound surface, without having produced any local effect on the part; but, has been absorbed, immediately after its application. Mr. Hunter affirms, that he has seen instances of this kind, though he confesses they are very rare, and, that, in most cases apparently of this nature, a small chancre may be found to have existed.

The second mode of absorption, or that taking place in a gonorrhœa, Mr. Hunter represents as more frequent.

The third mode is the absorption of matter from an ulcer, which may either be a chancre, or a bubo. This mode is by far the most common, and it proves, with many other circumstances, that a sore, or ulcer, is the most favourable for absorption. Mr. Hunter believed, that absorption was more apt to take place from sores on the prepuce, than those on the glans, and he says, he had seen more buboes from chancres in the first situation.

A fourth mode of absorption from a wound is also an occasional occurrence.

Mr. Hunter notices, that, what is now commonly understood by a bubo, is a swelling, taking place in the absorbing system, especially, in the glands, arising from the absorption of some poison, or other irritating matter. When such swellings take place in the groin, they are called buboes, whether they proceed from absorption, or not.

Mr. Hunter regards every abscess in the absorbing system as a bubo, whether in the vessels, or the glands, when the complaint originates from the absorption of venereal matter.

The matter is taken up by the absorbent vessels, and is conveyed by them into the circulation. In its passage through these vessels, it often affects them with the specific inflammation. The consequence is the formation of buboes, which are venereal abscesses. These are exactly similar to a chancre in their nature and effects, the only difference being in regard to size. As the lymphatic vessels and glands are irritated by the specific matter, before it has undergone any change in its passage, the inflammation produced, and the matter secreted, partake of the specific quality.

Inflammation of the absorbent vessels themselves is not nearly so frequent, as that of the glands. In men, such inflammations, in consequence of chancres upon the glans, or prepuce, generally appear, like a cord, leading along the back of the penis from the sores. Sometimes, the absorbents inflame, in consequence of the thickening and excoriation of the prepuce in gonorrhœa. The indurated lymphatics often terminate insensibly near the root of the penis, or near the pubes; while, in other instances, they extend further to a lymphatic gland in the groin. Mr. Hunter believed, that this affection to the absorbent vessels is truly venereal. The formation of a hard cord, the same author conceived, arose from a thickening of the coats of the absorbents, and from an extravasation of coagulable lymph on their inner surface.

A cord, of the above kind, often suppurates, sometimes in more places, than one, so as to form one, two, or three buboes, or small abscesses in the body of the penis.

Inflammation much more frequently affects the absorbent glands, than the vessels. The structure of the former parts appear to consist of the ramifications and reunion of the absorbent vessels. From this structure, observes Mr. Hunter, we may reasonably suppose, that the fluid absorbed is in some measure detained in these glands, and thus has a greater opportunity of communicating the disease to them, than to the distinct vessels.

Swellings of the absorbent glands may originate from other diseases, and such should be carefully discriminated from those, which arise from the venereal poison. With this view, Mr. Hunter advises us first to enquire into the cause, in order to ascertain, whether there is any venereal complaint at some greater distance from the heart, such as chancres on the penis, or any preceding disease in this situation. He recommends us to enquire, whether any mercurial ointment has been at all applied to the leg and thigh on the diseased side; for, mercury applied to those parts for the cure of a chancre, will sometimes cause glandular enlargements, which are occasionally mistaken for venereal ones. Mr. Hunter also reminds us to observe, whether there has been any preceding disease in the constitution, such as a cold, fever, &c. The quick, or slow, progress of the swelling, is likewise to be marked, and the tumour must be distinguished from femoral hernia, lumbar abscesses, and aneurisms of the crural artery.

Sometimes, the venereal matter does not produce its effects on the absorbent glands, for some time after absorption has taken place. In certain instances, Mr. Hunter notices, that, at least, six days have elapsed; a circumstance, which could only be known by the chancres having been healed six days before the bubo began to appear. However, Mr. Hunter infers, that the matter had been much longer absorbed, as the last matter of a chancre is probably not venereal.

Mr. Hunter next remarks, that the glands, nearest to the seat of absorption, are in general the only ones, which are attacked. Thus, when the matter has been taken up from the penis in men, the inguinal glands are affected; and, when from the vulva in women, those glands swell, which are situated between the labia and thigh, and the round ligaments.

It was one of Mr. Hunter's opinions, that only one gland at a time is commonly affected by the absorption of venereal matter. If this sentiment be correct, the circumstance may be considered as a kind of criterion between venereal and other buboes. The second order of lymphatic vessels and glands are never affected; as, for instance, those along the iliac vessels, or back. Mr. Hunter informs us, that he has also observed, that, when the disease was contracted by a sore, or cut upon the finger, the bubo occurred a little above the bend of the arm, by the side of the biceps muscle, and no swelling of this sort formed in the arm-pit. However, he mentions his having heard of a few rare cases, in which a swelling in the axilla was also produced.

When buboes arise from a venereal

disease on the penis, they are situated in the glands of the groin. When a bubo arises from a gonorrhœa, either groin may be attacked. But when the disease originates from a chancre, the bubo most frequently takes place in the nearest groin.

The situation of the absorbent glands, however, is not always exactly the same, and the course of the lymphatics therefore is subject to some variety. Hence, Mr. Hunter has seen a venereal bubo, produced by a chancre on the penis, situated a considerable way down the thigh; he has also often seen buboes as high as the lower part of the belly, before Poupart's ligament; and sometimes near the pubes.

BUBOES IN WOMEN.

The seat of absorption is more extensive in the female sex, and the course of some of the absorbents is also different. Hence, buboes in women may occur in three situations, two of which are totally different from those in men.

When chancres are situated forwards, near the meatus urinarius, nymphæ, clitoris, labia, or mons veneris, the absorbed matter is generally conveyed along one, or both of the round ligaments, and the buboes are formed in those ligaments, just before they enter the abdomen. Mr. Hunter suspected such buboes not to be glandular ones; but, only inflamed absorbents.

When chancres are situated far back, near, or on the perinæum, the absorbed matter is carried forward along the angle, between the labium and the thigh, to the glands in the groin, and often, in this course, there are formed small buboes in the absorbents, similar to those abscesses, which occur on the penis in men.

When the effects of the poison do not rest here, a bubo in the groin may be occasioned, in the same manner as in men.

It is more difficult to learn, whether a bubo is venereal in women, than men, owing to the frequent difficulty of ascertaining, that there is no infection present. In men, who have had no local complaint, the bubo can only be venereal, when direct absorption from the surface of the skin has taken place.

MANNER IN WHICH BUBOES MAKE THEIR APPEARANCE, &c.

A bubo, says Mr. Hunter, commonly begins with a sense of pain, which leads the patient to examine the part, where a small hard tumour is to be felt. This increases, like every other inflammation, that has a tendency to suppuration, and, unless checked, pus forms, and ulceration follows, the matter making its way to the skin very fast.

The above celebrated writer remarks, however, that there are some cases, which are slow in their progress. This circumstance he imputes either to the inflammatory process being kept back by mercury, or other means, or by its being retarded by a scrophulous tendency.

The inflammation, he says, is at first confined to the gland, which may be moved about in the cellular membrane; but, when the part has become enlarged, or when the inflammation, and suppuration, are more advanced, the surrounding parts become more inflamed, and the tumour is more diffused. Some buboes, become complicated with an erysipelatous and œdematous affection, by which means, they are rendered more diffused, and less disposed to suppurate.

Mr. Hunter allows, that to distinguish, with certainty, the true venereal bubo from swellings of the glands in the groin, may be very difficult. He represents the true venereal bubo, in consequence of a chancre, as being most commonly confined to one gland. It preserves its specific distance till suppuration has taken place, and then becomes more diffused. It is rapid in its progress from inflammation to suppuration and ulceration. The suppuration is commonly large, considering the size of the gland, and there is only one abscess. The pain is very acute, and the inflamed part of the skin is of a florid red colour.

Mr. Hunter describes such buboes, as arise without any visible cause, as being of two kinds. One sort inflame and suppurate briskly. These he always suspected to be venereal, although he allows, there was no proof of it, and only a presumption deduced from the quick progress of the disease.

The second kind are generally preceded, and attended with slight fever, or the common symptoms of a cold, and they are generally indolent and slow in their progress. If they are quicker, than ordinary, they become more diffused, than venereal ones, and they may not be confined to one gland. When very slow, they give but little sensation; but, when quicker, the sensation is more acute, though not so much so as in venereal cases. They usually do not suppurate, and often become stationary. When they do suppurate, it is in a slow manner, and, frequently, in more glands, than one, while the inflammation is more diffused, and not considerable, in relation to the swelling. The matter makes its way to the skin slowly, and the part affected is of a more purple colour. Sometimes, the abscesses are very large, yet not painful.

In considering whether the swellings of the inguinal glands are, or are not venereal, the first thing to be attended to is, whether, or not, there are any venereal complaints. If there are none, Mr. Hunter observes, that there is a strong presumptive proof, that the swellings are not venereal. When the swelling is only in one gland, very slow in its progress, and gives but little, or no pain, it is probably merely scrophulous. However, when the swelling is considerable, diffused, and attended with some inflammation and pain, the constitution is most probably affected with slight fever, the symptoms of which are lassitude, loss of appetite, want of sleep, small quick pulse, and an appearance of approaching hectic. Such swellings are long in getting well, and do not seem to be affected by mercury, even when very early applied.

Mr. Hunter mentions his having seen the above affection of the groin, together with the constitutional indisposition, take place, when there were chancres; and he was puzzled to determine, whether the disease in the groin was sympathetic, from derangement of the constitution, or from the absorption of matter. He had long suspected, that there was a mixed case, and was at last certain, that such a case may prevail. He says, he had seen instances, in which the venereal matter, like a cold, or fever, only irritated the glands to disease, producing in them scrophula, to which they were disposed.

In such cases, says Mr. Hunter, the swellings commonly arise slowly, give but little pain, and seem to be rather hastened in their progress, if mercury is given to destroy the venereal disposition. Some suppurate while under this resolving course; and others, which probably had a venereal taint at first, become so indolent, that mercury has no effect upon them, and, in the end, they either get well of themselves, or by other means.

Mr. Hunter states, that buboes are undoubtedly local complaints.

TREATMENT OF BUBOES.

When a bubo is certainly a venereal one, and only in an inflamed state, an attempt is to be made to resolve the swelling. The propriety of the attempt, however, depends on the progress, which the disease has made. If the bubo be very large, and suppuration appears to be near at hand, resolution is not likely to be effected. When suppuration has already taken place, Mr. Hunter much doubted the probability of any success attending the endeavour, which now might possibly only retard the suppuration, and protract the cure.

The resolution of these inflammations, says Mr. Hunter, depends principally on mercury, and almost absolutely on the quantity, which can be made to pass through them. When suppuration has taken place, the cure also depends on the same circumstances.

The quantity of mercury, which can be made to pass through a bubo, is represented by Mr. Hunter, as depending principally on the quantity of external surface for absorption beyond the bubo.

The mercury is to be applied to such surfaces, as allow the remedy, when absorbed, to pass through the diseased gland. In this manner, the disease in the groin is subdued, and the constitution is less liable to be contaminated.

However, Mr. Hunter accurately notices, that the situation of many buboes is such, as not to have much surface for absorption beyond them; for instance, the buboes on the body of the penis, arising from chancres on the glans, or prepuce.

When the bubo is in the groin, Mr. Hunter recommends surgeons to pay attention to whether the swelling is in the upper part of the thigh and groin, on the lower part of the belly before Poupart's ligament, or near the pubes. When the buboes are situated on the body of the penis, the absorbents, leading directly from the seat of absorption are themselves diseased. When the bubo is in the groin, and, at the upper part of the thigh, we may conclude, that the lymphatics, both from the penis and thigh, run to the affected gland. When the bubo is high up, or on the lower part of the belly, before Poupart's ligament, probably, the absorbents, which arise from about the groin, lower part of the belly and pubes, pass through the bubo. When the bubo is far forward, the absorbents of the penis and skin about the pubes, pass through the swelling. Mr. Hunter contends, that the knowledge of these circumstances is very necessary, in order to apply mercury in the most advantageous situations.

The utility of rubbing the mercury into surfaces, the absorbents of which lead through the bubo, must be obvious, when it is considered, that the medicine cannot pass to the common circulation, without going through the diseased parts; that it must promote the cure, as it passes though them; and that it also prevents the matter, which has already passed, and is still continuing to pass into the constitution, from acting there. Thus the bubo is cured, and the constitution, at the same time, preserved.

Mercury alone, however, is not always capable of effecting the cure of buboes.

When the inflammation rises very high, bleeding, purging, and fomenting, are generally recommended. When the in-

flammation was erysipelatous, Mr. Hunter had a high opinion of bark; and, when it was scrophulous, he used to recommend hemlock, and poultices made with sea-water.

The same eminent writer also takes notice of the fact of emetics sometimes occasioning the absorption of buboes, even after they contain matter.

1. *Resolution of the Inflammation of the Absorbents on the Penis.*

Though there is not surface enough beyond the bubo, for rubbing in a sufficient quantity of mercury, to prevent the effects of absorption, Mr. Hunter still advises this surface to be kept constantly covered with mercurial ointment. In consequence of the surface in question being so small, more mercury must also be conveyed into the system by the mouth, or frictions on some other part. Mr. Hunter observes, that this is necessary, both in order to prevent a lues venerea, and to cure the parts themselves. The quantity of mercury must be regulated by the appearances of the original complaint, and the readiness with which the disease gives way. The same method, he adds, is to be followed in women, and the ointment should be kept continually applied to the inside and outside of the labia.

2. *Resolution of Buboes in the Groin.*

The inflammation of the absorbent glands, is to be treated on the same principle as that of the vessels. In the first case, however, we are able to make a larger quantity of mercury pass through the diseased parts. When the bubo is in the groin, the mercurial ointment is to be rubbed on the thigh. This surface, as Mr. Hunter remarks, will in general absorb as much mercury as will be sufficient to resolve the bubo, and preserve the constitution from being contaminated; but, when resolution does not readily take place, the same author advises us to increase the surface of friction, by rubbing the ointment upon the leg.

When the bubo is on the lower part of the belly, the ointment should be rubbed also on the penis, scrotum, and belly. The same plan should be followed when the bubo is still more forward.

Mr. Hunter states, that when the bubo gives way, the mercurial frictions must be continued, till it has entirely subsided, and, perhaps, longer, on account of the chancre, which may not yield so soon as the bubo. After the bubo has suppurated, Mr. Hunter is doubtful, whether rubbing-in mercury is useful, or not.

3. *Resolution of Buboes in Women.*

When the swellings are situated between the labia and thigh, Mr. Hunter recomends the mercurial ointment to be rubbed in all about the anus and buttock, from which parts the absorbents probably run through the seat of the diseases. When the buboes are in the round ligaments, the surface for absorption will not be large enough, and more mercury must be internally given, or rubbed into other surfaces.

When the bubo is in one of the inguinal glands, the same plan is to be adopted, as in the same case in men.

4. *Buboes in unusual Situations.*

When buboes form in the arm, or armpit, in consequence of the absorption of venereal matter from wounds on the hands, or fingers, mercurial ointment should be rubbed on the arm and fore-arm. Mr. Hunter adds, however, that this surface may not be sufficient, so that it may be proper to convey more mercury into the system in other ways. He states, that he has seen a true venereal chancre on the middle of the lower lip, attended with a bubo, on each side of the neck, under the lower jaw, close to the maxillary gland. The swellings were resolved by applying mercurial ointment to them, and the chin, and lower lip.

5. *Quantity of Mercury necessary for the Resolution of a Bubo.*

Mr. Hunter observes, that the quantity of mercury, necessary for the resolution of a bubo, must be proportioned to the obstinacy of the complaint; but, that care must be taken not to extend the employment of the medicine so far as to produce certain effects on the constitution. When the bubo is in a situation, which admits of a large quantity of mercury being rubbed in, so as to pass through the swelling, and when the complaint readily yields to the use of half a drachm of mercurial ointment, every night, the mouth not becoming sore, or at most, only tender, the above author thinks it sufficient to pursue this course, till the gland is reduced to its natural size. In this manner, the constitution will probably be safe, provided the chancre, which may have caused the bubo, heals at the same time. When the mouth is not affected in six, or eight days, and the gland does not readily resolve, then two scruples, or a drachm, may be applied every night; and, continues Mr. Hunter, if there should still be no amendment, even more must be rubbed in. In short (says he) if the reduction is obstinate, the mercury must be pushed as far as can be done without a salivation.

When there is a bubo on each side, so much mercury cannot be made to pass through each, as the constitution in general will not bear this method. However,

Mr. Hunter sanctions the plan of minding the soreness of the mouth less in this kind of case; though, he adds, that it is better to let the buboes proceed to suppuration, than to load the system with too much mercury.

When the situation of buboes will not allow an adequate quantity of absorbed mercury to pass through them, the frictions must be continued in order to affect the constitution; but, according to Mr. Hunter, more mercury in this case will be requisite, than when the remedy can be made to pass directly through the diseased gland.

Many buboes remain swollen, without either coming to resolution, or suppuration; and, notwithstanding every attempt to promote these changes, the glands become hard and scirrhous. Mr. Hunter conceived, that cases of this sort are either scrophulous at first, or become so as soon as the venereal disposition is removed. He advises the use of hemlock, sea-water poultices, and sea-bathing.

6. *Treatment of Buboes which suppurate.*

The suppuration of buboes frequently cannot be prevented by any known means. They are then to be treated, in some respects, like any other abscess. Before opening buboes, Mr. Hunter conceived it was advantageous to let the skin become as thin as possible, as a large opening would then become unnecessary, and no measures would be requisite for keeping the skin from closing, before the bottom of the sore had healed.

Mr. Hunter thinks it doubtful whether the application of mercury should be continued through the whole suppuration. He was inclined to continue it; but, in a smaller quantity.

There has been much dispute, whether a bubo should be opened, or allowed to burst of itself, and whether the opening should be made with a cutting instrument, or caustic. On this subject, Mr. Hunter remarks, that there is no peculiarity in a venereal abscess to make one practice more eligible, than another. The surgeon, he says, should in some degree be guided by the patient. Some patients are afraid of caustics; others, of cutting instruments. But, when the surgeon has the choice, Mr. Hunter expresses a preference to opening the bubo with a lancet, in which method, no skin is lost. But he observes, that when a bubo is very large, and there will be a great deal of loose skin, after the discharge of the matter, he thinks, that caustic may, perhaps, be better, as it will destroy some of the redundant skin, and occasion less inflammation, than what is caused by an incision. The kali purum with the calx viva, is the caustic commonly employed.

After the bubo has been opened, surgeons usually poultice it, as long as the discharge and inflammation are considerable, and then they employ dressings, which must be of such a quality, as numerous undescribable circumstances may indicate. The use of mercury, in the mean while, is to be continued, both to make the bubo heal, and prevent the bad effects, which might otherwise arise from the matter beng continually absorbed. The mercury should also be rubbed in, so as to pass, if possible, through the diseased groin.

The mercurial course is to be pursued, till the sore is no longer venereal. But, in general, since this point is difficult to ascertain, the mercury must be given till the part has healed, and even somewhat longer, when the bubo has healed very quickly; for, the constitution is afterwards very apt to become contaminated.

However, mercury is not to be continued thus long in all cases; for, as Mr. Hunter explains, buboes often assume, besides the venereal, other dispositions, which mercury cannot cure; but, will even exasperate.

CONSEQUENCES OF BUBOES.

Sometimes, the sores, when they are losing, or entirely deprived of the venereal disposition, become changed into ulcers of another kind, and, most probably, of various kinds. How far it is a disease arising from a venereal taint, and the effects of a mercurial course jointly, says Mr. Hunter, is not certain. This writer suspected, however, that the nature of the part, or constitution, had a principal share in the malady.

Mr. Hunter observes, that such diseases make the cure of the venereal affection much more uncertain, because, when the sore becomes stationary, or the mercury begins to disagree, we are ready to suspect, that the virus is gone; but, this is not always the case. Perhaps, the action of the venereal poison is only suspended, and will commence again, as soon as the other disease ceases.

In these cases, Mr. Hunter recommends attacking the predominant disease; but, he allows there is difficulty in ascertaining its nature, and finding out, whether it is venereal, or not.

The same author also acquaints us, that he has seen some buboes exceedingly painful and tender to almost every thing, that touched them, and the more mild the dressings were, the more painful the parts became.

In some instances, the skin only seems to become diseased. The ulceration spreads to the surrounding integuments, while a new skin forms in the centre, and

keeps pace with the ulceration, so that an irregular sore, which Mr. Hunter compares with a worm-eaten groove, is formed all round. It appears only to have the power of contaminating the parts, which have not yet been affected; and those, which have, readily heal.

When buboes become stationary, and seem little inclined to spread, attended with a sinus, or two, hemlock, joined with bark, is, according to Mr. Hunter, the medicine most frequently serviceable. It is best to use it both externally and internally. The same author also speaks favourably of sarsaparilla, sea-bathing, and sea-water poultices. He states, that at the Lock Hospital, gold-refiners' water has been found a useful application; that, in some cases, drinking large quantities of orange-juice, and in others taking mezereon, have been found serviceable.

LUES VENEREA.

Surgeons imply, that a *lues venerea* has taken place, when the venereal virus has been absorbed into the circulation. Mr. Hunter does not think the epithet *constitutional* strictly proper in its application to this form of the venereal disease. By *constitutional* disease, he observes, he should understand that, in which every part of the body is acting in one way, as in fevers of all kinds; but, the venereal poison seems to be only diffused through the circulating fluids, and, as it were, to force certain parts of the body to assume the venereal action, which action is perfectly local. To use Mr. Hunter's phrase, it takes place in different parts in a regular succession of susceptibilities. Only a few parts are acting at the same time; and a person may be constitutionally affected in this way, and yet almost every function may be perfect.

The venereal poison is generally conveyed into the system from a chancre. It may, also, according to Mr. Hunter's doctrine, be absorbed from a gonorrhœa. There is likewise a possibility of its getting into the circulation from the surface of the body, without any previous ulceration. It may be absorbed from common ulcers, without necessarily rendering these venereal; and it may be taken up from wounds, in which cases, it in general induces a previous ulceration in the wound.

VENEREAL ULCERS.

In consequence of the blood being contaminated with real venereal pus, it might be expected, that the local effects, thus produced, would be similar in their nature to those, producing them. Mr. Hunter believed, that this is not the case. He notices, that the local effects, from a constitutional contamination, are all of one kind, viz. ulcers, let the effects make their appearance on any surface whatever, either the throat, or common skin. But, Mr. Hunter conceived, that if the matter, when in the constitution, were to act upon the same specific principles, as that, which is externally applied, a gonorrhœa would arise, when it affected a canal, and, only sores, or chancres, when it attacked other surfaces.

Mr. Hunter found, that even the sores, which are caused in the throat, are very different from chancres. He says, that the true chancre produces considerable inflammation, often attended with a great deal of pain, and quickly followed by suppuration. But, the local effects, arising from the virus in the constitution, are slow in their progress, attended with little inflammation, and are seldom or ever painful, except in particular parts. However, Mr. Hunter allows, that this sluggishness in the effects of the poison depends on the nature of the parts diseased; and, he owns, that when the tonsils, uvula, or nose, are affected, the progress of the morbid mischief is rapid, and bears a greater resemblance to a chancre, than when it occurs on the skin. Even, in those parts Mr. Hunter thought, the ulcers were attended with less inflammation, than chancres, which were spreading with equal celerity.

The matter, secreted by such sores, as arise from a constitutional contamination, was always considered, before the time of Mr. Hunter, as being of a poisonous quality, like the matter of a chancre. At first, one would certainly expect, that this was actually the case, because venereal matter is the cause, and mercury cures chancres, and also ulcers proceeding from a lues venerea. Mr. Hunter remarks, however, that the latter circumstance is not a decisive proof, since mercury is capable of curing many diseases, besides the venereal. He also takes notice, that, when pus is absorbed from a chancre, it generally produces a bubo; but, that a bubo is never occasioned by the absorption of matter from a venereal sore, arising from the virus diffused in the circulation. For instance, when there is a venereal ulcer in the throat, no buboes occur in the glands of the neck; when there are syphilitic sores on the arms, or even suppurating nodes on the ulna, no swellings form in the glands of the armpit, although these complaints occur, when fresh venereal matter is applied to a common sore on the arm, hand, or fingers. No swelling is produced in the groin, in consequence of nodes, or blotches on the legs and thighs.

Some very important experiments are related in Mr. Hunter's Treatise on the Venereal Disease, in order to shew, that the matter from a gonorrhœa, or chancre, is capable of affecting a man locally, who has already got a lues venerea, and that the matter from secondary syphilitic sores has not the same power. The particulars, however, are too long to be inserted in this book.

PARTS MOST SUSCEPTIBLE OF THE LUES VENEREA, &c.

Some parts of the body seem to be much less susceptible of the lues venerea, than others; indeed, Mr. Hunter observes, that, as far as our knowledge extends, certain parts cannot be affected at all. The brain, heart, stomach, liver, kidneys, and several other viscera, have never been known to be attacked by the lues venerea.

The *first order of parts*, or those, which become affected in the early stage of the lues venerea, are the skin, tonsils, nose, throat, inside of the mouth, and sometimes the tongue.

The *second order of parts*, or those, which are affected at a later period, are the periosteum, fasciæ, and bones.

Mr. Hunter conceived, that one great reason of the superficial parts of the body suffering the effects of the lues venerea, sooner than the deep-seated ones, depended on the former being more exposed to external cold. Even the second order of parts do not all become diseased at the same time, nor every where at once. But, on the contrary, it is observed, that, those, which are nearest the external surface of the body, are first diseased, as, for instance, the periosteum, or bones of the head, the tibia, ulna, bones of the nose, &c. Neither does the disease affect these bones on all sides equally; but, first on that side, which is next to the external surface. Mr. Hunter notices, however, that the susceptibility of particular bones does not altogether depend on their nearness to the skin; but, on this circumstance, and their hardness together.

After many ingenious observations, Mr. Hunter presents the reader of his treatise with the following summary of his doctrines of the lues venerea.

First; that most parts, if not all, that are affected in the lues venerea, are affected with the venereal irritation at the same time.

Secondly; that the parts, exposed to cold, are the first which admit the venereal action; then the deeper-seated parts, according to their susceptibility for such action.

Thirdly; the venereal disposition, when once formed in a part, must necessarily go on to form the venereal action.

Fourthly; that all parts of the body, under such disposition, do not run into action equally fast, some requiring six or eight weeks; others, as many months.

Fifthly; in the parts, which first come into action, the disease continues to increase, without wearing itself out; while those, which are second in time, follow the same course.

Sixthly; mercury hinders a disposition from forming, or, in other words, prevents contamination.

Seventhly; mercury does not destroy a disposition already formed.

Eighthly; mercury hinders the action from taking place, although the disposition be formed.

Ninthly; mercury cures the action.

On these principles, Mr. Hunter asserts, that the cure of the disease may be easily explained.

SYMPTOMS OF LUES VENEREA.

Mr. Hunter remarks, that the time, necessary for the appearance, or production of the local effects, in parts most susceptible of the disease, after the virus has got into the constitution, is uncertain; but, he says, in general, it is about six weeks; in many cases, the period is much longer; in other instances, it is shorter. Sometimes, the local effects make their appearance within a fortnight after the possibility of absorption.

The effects, on other parts of the body, which are less susceptible of the venereal irritation, or slower in their action, are of course much later in making their appearance. Mr. Hunter also notices, that when the first and second order of parts are both contaminated, the effects, generally, do not begin to appear in the latter, till after a considerable time, and sometimes, not till those affecting the former parts have been cured.

Mr. Hunter, however, mentions his having seen instances, in which the periosteum, or bone, has been affected before any of the first order of parts: but, he was uncertain, whether the skin, or throat, would afterwards have become diseased, as the disorder was not allowed to go on.

In the first order of parts, most susceptible of the effects of lues venerea, the disease is much quicker in its progress, than in the second order of parts. Mr. Hunter represents, that the symptoms in each succeeding part, which becomes affected, are slower and slower in their progress, and of a more fixed kind. It was also an observation, made by the same ingenious writer, that similar parts come sooner into action, and appear to

go on more rapidly with it, in proportion as they are nearer the source of the circulation. The disease appears earlier on the face, head, shoulders, and breast, and the eruptions suppurate sooner than on the legs."

SYMPTOMS OF THE FIRST STAGE OF THE LUES VENEREA.

According to Mr. Hunter, the first symptoms of the disease, after absorption, appear either on the skin, or in the throat, or mouth.

VENEREAL ERUPTIONS.

The appearances on the skin generally occur all over the body. The discolourations make the skin appear mottled, and many of the eruptions disappear, while others continue, and increase with the disease.

In other cases, the eruption comes on in distinct blotches, which are often not observed, till the scurfs have begun to form. At other times, the eruption assumes the appearance of small distinct inflammations, containing matter, and resembling pimples, not being, however, so pyramidal, nor so red at the base. Mr. Hunter also observes, that venereal blotches, on their first coming out, are often attended with inflammation, which gives them a degree of transparency, which is generally greater in the summer, than the winter, especially, if the patient be kept warm. In a little time, this inflammation disappears, and the cuticle peels off in the form of a scurf. The latter occurrence often misleads the patient and the surgeon, who look upon this dying away of the inflammation, as a decay of the disease, till a succession of scurfs undeceives them. Mr. Hunter adds, that the discolourations of the cuticle arise from the venereal irritation, and are to be seldom regarded as a true inflammation, since they rarely have any of its characteristics, such as tumefaction and pain. However, he explains, that in parts, which are well covered, or which are constantly in contact with other parts, there is more of the true inflammatory appearance, especially, about the anus.

The parts affected next begin to alter their appearance, and form a copper-coloured, dry, inelastic cuticle, called a scurf. This is thrown off, and new ones are formed. Mr. Hunter relates, that these appearances spread to the breadth of a sixpence, or shilling; but, seldom more extensively, at least, for a considerable time. In the mean while, every succeeding scurf becomes thicker and thicker, till at last it becomes a common scab. Then the disposition for the formation of matter takes place in the cutis underneath, and a true ulcer is formed, which commonly spreads, although in a slow way.

Mr. Hunter states, that these appearances arise first from the gradual loss of the true sound cuticle, which the diseased cutis cannot reproduce. As a kind of substitute for this want of cuticle, an exudation takes place, and forms a scale. The matter afterwards acquiring more consistence, at last forms a scab. However, before the disease has attained this condition, the cutis has ulcerated, after which the discharge is more like true pus. When this form of the lues venerea attacks the palms of the hands and soles of the feet, where the cuticle is thick, this latter part first becomes separated, and peels off. A new one is immediately formed, which also separates. In this manner, a series of new cuticles take place, in consequence of scurfs not being so readily formed as on the common skin. When the disease is confined to the palms of the hands, or soles of the feet, Mr. Hunter mentions, that there is difficulty in determining whether it is venereal, or not; because, most diseases of the cutis, in these situations, produce a separation of the cuticle, attended with the same appearances in all, and having nothing characteristic of the venereal disease.

When the affected part of the skin is opposed by another portion of skin, which keeps it in some degree more moist, as between the nates, about the arms, between the scrotum and the thigh, in the angle between the two thighs, on the red part of the lip, or in the arm-pits, the eruptions, instead of being attended with scurfs and scabs, become accompanied by an elevation of the skin, which is swollen with extravasated lymph into a white, soft, moist, flat surface, which discharges a white matter.

A venereal eruption often attacks that part of the fingers, on which the nail is formed. Here, the disease renders that surface red, which is seen shining through the nail; and, if allowed to continue, a separation of the nail takes place, similar to that of the cuticle in the above cases. However, Mr. Hunter states, that there cannot be the same regular succession of nails, as of cuticles in other instances.

Such surfaces of the body, as are covered with hair, may also be attacked, and the hair separates, and cannot be produced as long as the disease lasts.

VENEREAL DISEASE OF THE THROAT, MOUTH, AND TONGUE.

In the throat, tonsils, and inside of the mouth, the disease generally makes its appearance at once in the form of an ul-

cer, without much previous tumefaction. Consequently, the tonsils are not much enlarged. It is observed by Mr. Hunter, that, the venereal inflammation attacks the surface of these parts, and very soon forms an ulcer.

A venereal ulcer in the throat should be carefully distinguished from other kinds of sores in the same situation. The syphilitic one is in general tolerably well marked. However, Mr. Hunter confesses, that, it may not in every instance be distinguishable from an ulcer of a different nature. Sores in the throat, which are really venereal, may resemble others which are not so. The same celebrated author mentions, that there are several diseases of this part, which do not produce ulceration on the surface. One of these is common inflammation of the tonsils. The inflamed place often suppurates in the centre, so as to form an abscess, which bursts by a small opening; but, never looks like an ulcer, that has begun upon the surface, like a true venereal one. The case, just alluded to, is always attended with too much inflammation, pain, and tumefaction, of the parts, to be venereal. Also when it suppurates and bursts, it subsides directly, and it is generally attended with other inflammatory symptoms in the constitution.

Mr. Hunter next takes notice of another disease, consisting of an indolent tumefaction of the tonsils, and peculiar to many persons, whose constitutions are disposed to scrophula. The complaint produces a thickness in the speech. Sometimes coagulable lymph is thrown out on the surface of the parts affected, and occasions appearances, which are by some called ulcers; by some, sloughs; and occasionally, by others, putrid sore-throats. The case is attended with too much swelling to be venereal, and, with a little care, it may easily be distinguished from an ulcer, or loss of substance. However, when this difference is not obvious at first sight, it is proper to endeavour to remove some of the lymph, and, if the surface of the tonsil underneath should appear to be free from ulceration, we may conclude with certainty, that the disease is not venereal. Mr. Hunter states, that he has seen a chink filled with coagulable lymph, so as to appear very much like an ulcer; but, on removing that substance, the tonsil underneath was found perfectly sound. He adds, that he has seen cases of a swelled tonsil, having a slough in its centre, which slough, before its detachment, looked very like a foul ulcer. The stage of the complaint, he says, is even more puzzling, when the slough has come out; for, then the disease has most of the characters of the venereal ulcer. Whenever he met with the disease in its first stage, he always treated it, as if it had been of the nature of erysipelas, or a carbuncle. When the complaint is in its second stage, without any preceding local symptoms, he recommends the practitioner to suspend his judgment, and to wait a little, in order to see how far nature is able to relieve herself. If there should have been any preceding fever, the case is still less likely to be venereal. Mr. Hunter informs us, that he has seen a sore-throat of this kind mistaken for venereal, and mercury given, till it affected the mouth, when the medicine brought on a mortification of all the parts concerned in the first disease.

Another complaint of these parts, which Mr. Hunter represents as being often taken for a venereal one, is an ulcerous excoriation, which runs along their surface, becoming very broad and sometimes foul, having a regular termination, but, never going deeply into the substance of the parts, as the venereal ulcer does. No part of the inside of the mouth is exempted from this ulcerous excoriation; but, Mr. Hunter thought, that the disease most frequently occurred about the root of the uvula, and spread forwards along the palatum molle. He remarks, that the complaint is evidently not venereal, since it does not yield to mercury. He has seen these ulcerous excoriations continue for weeks, without undergoing any change, and a true venereal ulcer make its appearance on the surface of the excoriated part. He says, that the excoriations in question have been cured by bark, after the end of the mercurial course, which cured the syphilitic sore.

This author describes the true venereal ulcer in the throat, as a fair loss of substance, part being dug out, as it were, from the body of the tonsil; it has a determined edge, and is commonly very foul, having thick white matter, like a slough, adhering to it, and not admitting of being washed away. Ulcers in such situations are always kept in a moist state, and the matter cannot dry and form scabs, as it does on sores upon the skin. The ulcer is also much more rapid in its progress, and generally has thickened edges.

When lues venerea attacks the tongue, it sometimes produces a thickening and hardening of the part. However, it also frequently gives rise to ulceration, as in other parts of the mouth.

Venereal sores on the tongue, are generally more painful, than those on the skin; but, less so, than common sore-throats from inflamed tonsils. They oblige the patient to speak thick, as if

his tongue was too large for his mouth, with a small degree of snuffling.

Mr. Hunter doubted the reality of a venereal ophthalmy, though he owns there are inflammations of the eyes, which yield to mercury. The case, commonly supposed to be venereal, is described in the article *Ophthalmy*.

SYMPTOMS OF THE SECOND STAGE OF THE LUES VENEREA.

The second order of parts, or those, which are commonly affected at a later period, may occasionally assume the venereal action, before the disease has produced its local effects on the first order of parts; and they may even go on with the action, in many cases, after these latter have taken on the action, and been cured.

The periosteum, fasciæ, tendons, ligaments, and bones, are the parts, which are usually affected in the second stage of the lues venerea. Mr. Hunter remarks, however, that we cannot always know with certainty what parts may become affected in this stage of the disease. He says, he has known the distemper produce a total deafness, sometimes followed by suppuration, and great pain in the ear, and side of the head. We have already explained, that it was one of this gentleman's doctrines, that the second order of parts were generally deep-seated. When these become irritated by the poison, he observes, that the progress of the disease is more gradual, than in the first order of parts. It assumes very much the character of scrophulous swellings, or chronic rheumatism; only it affects the joints, less frequently, than the latter affection does. A swelling sometimes makes its appearance on a bone, when there has been no possible means of catching the infection for many months; and, in consequence of the little pain experienced, the tumour may be of some considerable size, before it is noticed. Sometimes, a great deal of pain is felt; but, no swelling comes on, till after a long while. Mr. Hunter states, that these remarks are also applicable to swellings of the tendons, and fasciæ. As tumours of this kind only increase by slow degrees, they are not attended with symptoms of much inflammation. When they attack the periosteum, they seem like an enlargement of the bone itself, in consequence of being very firm, and closely connected with the latter part. Mr. Hunter also further observes, that, in these advanced stages of the disease, the inflammation can hardly get beyond the adhesive kind, in which state, it continues to become worse and worse, and when matter is formed, it is not true pus, but of a slimy description. Some nodes, he says, both of the tendons and bones, last for years, before they form any matter at all. These cases, he mentions as not being certainly venereal, though commonly considered as such.

It is not easy to explain the reason, why, when lues venerea attacks the bones, or the periosteum, the pain should sometimes be very considerable, and, sometimes, very trivial. The pains are usually of a periodical kind, being, in general, most severe in the night-time.

TREATMENT OF LUES VENEREA.

The first order of parts, or those which are most susceptible of being affected in lues venerea, are also the easiest of cure, while the second order of parts take more time to be remedied.

In the class of complaints, arising in the second stage of the lues venerea, Mr. Hunter believed, that it was unnecessary to continue the employment of mercury, till all the swelling had disappeared. For, it is observed by this distinguished writer, that, since these local complaints cannot contaminate the constitution by re-absorption, and since the venereal disposition and action from the constitution can be cured, while the local effects still remain, and this even when the tumefaction, forming nodes on the bones, fasciæ, &c. has proceeded to suppuration, there can be no occasion for continuing the course, after the venereal action has been destroyed. Mr. Hunter thought, that in this latter stage of the lues venerea, the syphilitic irritation was more easy of cure, than the swelling and other effects of that irritation.

Mercury, in the lues venerea, as well as in cases of chancres, is the great specific. In the present state of our knowledge, nothing else is to be depended upon.

For an account of the various ways of exhibiting this valuable medicine, I must refer the reader to the article *Mercury*, in this Dictionary.

In curing the lues venerea, mercury can only have two modes of action; one on the poison; the other on the constitution. If, says Mr. Hunter, mercury acted on the poison only, one might conceive it did so, either by destroying its qualities, by decomposing it, or else by attracting it and carrying it out of the circulation. If mercury acted in the first of these ways, one would expect, that the cure would depend on the quantity of the medicine taken into the system. If it acted in the second manner, one would infer, that, the progress of the cure would be proportionate to the quantity of evacuation. But,

observes Mr. Hunter, if it act upon the principle of destroying the diseased action of the living parts, and of counteracting the venereal irritation, by producing one of a different kind, then, neither quantity alone, nor evacuations, will avail much. He states, that the quickness of the cure depends on quantity, joined with visible effects. However, it is added, that, although the effects, which mercury has upon the venereal disease, are in some degree proportioned to the local effects of the medicine on some of the glands, or particular parts of the body, as the mouth, skin, kidneys, and intestines, yet such effects are not altogether proportioned to these other circumstances. When mercury disagrees with the constitution, so as to produce great irritability and hectic symptoms, this action, or irritation, as Mr. Hunter explains, is not a counter-irritation to the venereal disease.

It was also noticed by the same author, that the effects of mercury on lues venerea, are always in proportion to the quantity of the remedy, exhibited in a given time, and the susceptibility of the constitution to the mercurial irritation. He says, that these circumstances require the minutest attention, and that, in order to obtain the greatest action of mercury with safety, and in the most effectual manner, the medicine must be given, till it produces effects somewhere. However, it must not be exhibited too quickly, in order that a sufficient quantity may be given, before we are obliged to stop, in consequence of the effects. Mr. Hunter justly informs us, that when the local effects are produced too quickly, they prevent a sufficient quantity of the remedy from being taken into the system to counteract the venereal irritation at large.

Mr. Hunter mentions his having seen some cases, in which mercury acted very readily locally, and, yet the constitution was hardly affected by it, for the disease would not give way. He states, that he has met with other cases, in which the mere quantity of mercury did not answer, till it was given so quickly as to affect the constitution in such a manner, as to produce local irritation, and, consequently, sensible evacuations. This, he observes, is a proof, that the local effects of mercury are often the sign of its specific effects on the constitution at large, and shews, that the susceptibility of the diseased parts to be affected by the medicine, is in proportion to its effects on the mouth. Its effects, he contends, are not to be imputed to evacuation; but, to its irritation. Hence, he inculcates, that mercury should be given, if possible, in such a manner, as to produce sensible effects upon some parts of the body, and in the largest quantity that can be given, to produce these effects within certain bounds. Mr. Hunter also remarks, that these sensible effects should be the means of determining, how far the medicine may be pushed, so as to have the greatest effect on the disease, without endangering the constitution. The practice must vary according to circumstances; and, if the disease is in a violent degree, less regard must be had to the constitution, and mercury must be thrown into the system in larger quantities.

Mr. Hunter likewise acquaints us, that, when the disease is in the first order of parts, a smaller quantity of mercury is necessary, than when the second order of parts are affected, and the disease has been of long standing, its first appearances alone being cured, and the venereal disposition still remaining in the secondary parts. For the purpose of curing the venereal disease, whether in the form of chancre, bubo, or lues venerea, Mr. Hunter was of opinion, that probably the same quantity of mercury is necessary. He represents, that one sore requires as much mercury as fifty sores in the same person, and a small sore as much as a large one. He thought, that the only difference, if there is any, must depend upon the nature of the parts affected, that is, on their being naturally active or indolent. He conceived, however, that, on the whole, recent venereal complaints are generally more difficult of cure, than the symptoms of lues venerea, and that this may make a difference, in regard to the quantity of mercury necessary.

The principles above laid down, and other observations, contained in the article *Mercury*, must suffice for the direction of the cure of lues venerea by this great specific remedy. Other information, connected with the subject, will be found by referring to *Acidum Nitricum*, *Guaiacum*, *Mezereon*, *Sarsaparilla*, &c.

With respect to the local treatment of the symptoms of lues venerea, Mr. Hunter thought, that none would in general be necessary, since the constitutional treatment would commonly effect a cure.

The same writer notices, however, that sometimes the local effects will not give way, and the parts remain swollen in an indolent inactive state, even after there is every reason to believe, that the constitution is perfectly cured. In such cases, he recommends assisting the constitutional treatment by local applications of mercury to the part, either in the form of a plaster, or ointment. The latter application, he says, is the best. When these are not sufficient, he advises an attempt to be made to excite inflammation of another kind. He says, he has seen a ve-

nereal node, which gave excruciating pain, cured by merely making an incision down to the bone, the whole length of the node. The pain ceased, the swelling decreased, and the sore healed up kindly, without the assistance of a grain of mercury. He mentions, that blisters have been applied to nodes with success, removing the pain, and taking away the swelling.

DISEASES RESEMBLING THE VENEREAL.—PSEUDO-SYPHILIS.

Sores on the glans penis, prepuce, &c. in the form of chancres, as Mr. Hunter notices, may and do arise without any venereal infection, although in general they are a consequence of former venereal sores, which have been cured.

The symptoms, produced by the venereal poison in the constitution, are such as are common to many other diseases. For instance, Mr. Hunter remarks, that blotches on the skin are common to what is called scorbutic habit; pains are common to rheumatism; swellings of the bones, periosteum, fasciæ, &c. to many bad habits, perhaps, of the scrophulous and rheumatic kind. Thus, says this valuable writer, most of the symptoms of the venereal disease, in all its forms, are to be found in many other diseases. Hence, the original cause, and many leading circumstances, such as dates, effects of the disorder upon others, from connexion, when only local, the previous and present symptoms, &c. must be considered, before we can determine absolutely what the disease truly is. All the circumstances and symptoms, taken together, may be such, as will attend no other disease. However, Mr. Hunter confesses, that with all our knowledge, and with all the application of that knowledge to suspicious symptoms of this disease, we are often mistaken, calling distempers venereal, which are not so, and sometimes supposing really syphilitic affections to be of another nature.

Mr. Hunter takes notice, that, in some constitutions, rheumatism, in many of its symptoms, resembles the lues venerea. The nocturnal pains, swelling of the tendons, ligaments, and periosteum, and pain in those swellings, are symptoms both of the rheumatism, and also of the venereal disease, when it attacks those parts. Mr. Hunter, however, did not know, that he ever saw the lues venerea attack the joints, though many rheumatic complaints of such parts are cured by mercury, and therefore supposed to be venereal.

Mercury, given without caution, often produces the same symptoms as rheumatism. Mr. Hunter has seen such complaints supposed to be venereal, and the medicine continued.

This interesting author also explains, that some diseases not only resemble the venereal in appearance, but, in the mode of contamination, proving themselves to be poisons by affecting the part of contact; then producing immediate consequences similar to buboes; and also remote consequences similar to the lues venerea.

Mr. Hunter observes, that it is nearly as dangerous, in some constitutions, to give mercury, when the disease is not venereal, as to omit it in other cases, which are really syphilitic. Many of the constitutions, which put on some of the venereal symptoms, when the disease is not really present, are those, with which mercury seldom agrees, and commonly does harm. Mr. Hunter has seen mercury, which was exhibited for a supposed venereal ulcer of the tonsils, produce a mortification of those glands, and the patient was nearly destroyed.

Mr. Abernethy, in his *Surgical Observations*, 1804, has treated at some length of diseases resembling syphilis, and has adduced several very interesting cases, which I advise every surgical practitioner to read with the greatest attention. The following case, recorded by this gentleman, I shall take the liberty of quoting.

"A gentleman (says Mr. Abernethy) thought, that he had infected a slight cut on his hand (which was situated in front of and just below the little finger) with the discharge from a bubo in the groin, that he had occasion to open. The wound fretted out into a sore about the size of a sixpence, which he shewed me, and which I affirmed had not the thickened edge and base, and other characters of a venereal chancre. I therefore recommended him to try the effect of local means, and not to use mercury.

"In about a month the sore, which had spread a little, became again contracted in its dimensions, and assumed an healing appearance. At this time pain was felt extending up the arm, and suddenly a considerable tumour arose over the absorbing vessels, which proceed along the inner edge of the biceps muscle. This tumour became nearly as big as a small orange. As the original sore seemed now disposed to heal, and as there was no surrounding induration, I could not believe it venereal, and therefore recommended him still to abstain from mercury, and apply leeches and linen moistened in the aq. litharg. acet. comp. to the tumour formed over the inflamed absorbents. For it seemed to me, that if the venereal poison had been imbibed from the sore, it would have passed on to one of the axillary glands, and would have caused induration and inflammation to take place there, more slowly,

than had occurred on the present occasion.

"Under this treatment the tumour was discussed, and the sore at the same time healed. About three weeks afterwards the patient called on me, and said that there were venereal ulcers in his throat; and in each tonsil there was an ulcer deeply excavated, with irregular edges, and with a surface covered by adhering matter; ulcers, in short, which every surgeon, who depends on his sight as his guide, would have pronounced to be venereal. Shortly after also, some copper-coloured eruptions appeared on his face and breast. He shewed his diseases to several surgeons, on whose opinion he relied, who, without hesitation, affirmed that they were venereal, and that the mercurial course had been improperly delayed.

"Whilst the patient was looking out for lodgings, in order that he might go through the mercurial process, a circumscribed thickening and elevation of the pericranium covering the frontal bone, appeared; it was of the circumference of an half-crown piece; and was, in short, what every surgeon, who is guided only by his sight and touch, would, without hesitation, have called a fair corona veneris. I now told the patient that I was more inclined to believe his disease was not syphilitic, from the sudden and simultaneous occurrence of this node with the sore throat, &c. Other surgeons thought differently; and I believe this very sensible and amiable young man imagined, that his health would become a sacrifice, if he any longer attended to my opinion. He was preparing to submit to a mercurial course, when very important concerns called him instantly into the country. He went with great reluctance, taking with him mercurial ointment, &c.: and after a fortnight I received a letter from him, saying that he found his complaints benefited by his journey, that business had prevented him from beginning the use of mercury for a few days, that he now found it was unnecessary, for his symptoms had almost disappeared, and shortly afterwards he became perfectly well."

Mr. Abernethy considers this case as the most unequivocal instance extant of a disease occurring, which could not from appearance be distinguished by surgeons of the greatest experience from syphilis, and which, however, was undoubtedly of a different nature. He believes, that there is no one, who would not have decided on this case, as those did who declared it to be venereal, unless they had had an opportunity of watching its progress very attentively.

Mr. Abernethy, in the course of his remarks, makes it appear, that cases, which are venereal, and others, which are not, cannot in general be discriminated by the mere aspect of the affections. He believes, however, that there are some circumstances, in the progress of such different distempers, from which a line of distinction might be drawn.

A very simple fact has enabled this gentleman in most cases to distinguish the two diseases: "yet, simple as it is, (says Mr. Abernethy,) if it be generally true, it is very important; and if it were universally true, it would be of the highest consequence. The fact alluded to is, that the constitutional symptoms of the venereal disease are generally progressive, and never disappear unless medicine be employed. It may be added too, they are as generally relieved under an adequate effect of mercury on the constitution, &c.

"I have asked the opinion of several surgeons of great practice and abilities respecting this question; Whether constitutional symptoms of syphilis do ever spontaneously amend? and no one has decidedly replied in the affirmative, whilst all, without hesitation, agreed that they were generally progressive till checked by the effect of mercury. It seemed useless to seek further information; for what surgeon is there, at present, if he sees diseases, that cannot be distinguished by the sight from syphilis, and hears that they arose in consequence of a chancre, that would suspend his judgment, and forbear to administer mercury? If I have lived in the habit of so frequently detecting the imposing appearances of the secondary effects of these diseases, it is because I have been upon the watch, and because they have occurred in patients, in whom I have seen the primary sores, the appearance and progress of which have excited my suspicion as to their nature. I have stated the rule as general, but not universal; for I could myself relate cases of diseases, in which, from the great abatement, and even disappearance of symptoms, I have concluded the disease was not syphilitic; yet, from the duration of the disorder, or from the subsequent aggravation of its symptoms, the patient has desired, and I have recommended the use of mercury, and the disease has been treated as venereal, without its real nature being ascertained.

"The rule, which has been mentioned, relates to the constitutional symptoms of the venereal disease, for the primary ones, chancres, do sometimes heal spontaneously, generally, however, though not constantly, leaving a thickening or induration of the affected part. They may also be induced to heal by topical means, without mercury, with similar

events. Some enlargements of glands in the groin will also in like manner subside.

"It may be fairly supposed, that if some chancres heal spontaneously, that constitutional diseases arising from the same cause, may, in like manner, sometimes get better without medicine. The administration of nitrous acid, opium, and other remedies have been said to have amended, if not entirely cured, these constitutional diseases. But the question is, will they get better spontaneously? and the question can only be solved by experience. Delay will frequently enable a surgeon to decide; but, there are cases, in which no amendment takes place, and the surgeon is as it were forced, from the progress of the disease, to employ mercury.

"In recommending prudent delay and attentive observation, I hope and believe, (continues Mr. Abernethy,) that I am not recommending any thing likely to be of dangerous consequence. The venereal disease is generally soon checked by the use of mercury; and in constitutions, where much medicine is required to counteract its effects, that medicine may be given with freedom. By delay and observation, we perhaps may perceive, that eruptions and sore throats, which could not from appearance be distinguished from venereal, spontaneously amend: that some eruptions scale and become well, and the probability will of course be that the rest will do so likewise: or that an ulcer mends in one part, though it may spread in another, when the natural inference is that the diseased actions in the sore will gradually cease, and health return spontaneously; and that what has occurred in one part of an ulcer, will successively take place in another.

"In recommending delay it cannot, I suppose, be thought that I would advise any one to wait till an ulcer destroyed the velum pendulum palati, or did material injury to any important part. There are cases where the progress of the disease obliges a surgeon to use mercury, even though he may be suspicious that it is not syphilitic. The effect of exciting a mercurial affection of the constitution in diseases resembling syphilis is, as far as my observation enables me to determine, very various. It sometimes cures them very suddenly and very differently from the gradual amendment, which it produces in truly venereal diseases. Sometimes, however, these diseases yield more slowly to its operation, and are cured permanently. Sometimes the diseases recur in the same parts after a severe course of mercury; sometimes mercury merely checks the disease, and can scarcely be said to cure it; in which case it seems important to support the strength of the constitution, and to keep up that mercurial effect which controuls the disease, and can be borne without material derangement of the constitution for a great length of time. Sometimes also the use of mercury aggravates these diseases.

"Again, in some constitutions, the venereal disease may assume unusual characters, and be very difficult of cure. It must then be scarcely possible to discriminate between these anomalous cases of syphilis and those of diseases resembling it, unless some new distinctions are discovered." (See *Surgical Observations, by John Abernethy, F. R. S.*)

For information concerning the venereal disease, the reader should particularly consult *Astruc de Morbis Venereis. John Vigo's Whole Works in Chirurgerie, by Gale*, 1586; *or the Latin edition published at Leyden, in* 1518. *Fallopius de Morbo Gallico. Antonius Musa Brasavolus in the Aphrodisiacus. Ulricus de Hutten de Morbo Gallico. Boerhaavius de Lue Venereâ*, 12mo. 1751. *Rondeletti Opera Omnia*, 4to; *Genevæ*, 1610. *Morgagni de Sedibus et Causis Morborum. Francantianus de Morbo Gallico*, 8vo. *Patav.* 1563. *Gataker on Venereal Complaints*, 1754. *Chapman on the Venereal Disease*, 1770. *Fordyce on the Venereal Disease, with an Appendix*, 1777. *Plenck Doctrina de Morbis Venereis. B. Bell's Treatise on Gonorrhœa Virulenta, and Lues Venerea, edit.* 2, 1797. *Lalonette's New Method of Curing Diseases by Fumigation*, 8vo. 1777. *Hunter's Treatise on the Venereal Disease, edit.* 2.; *which is by far the most valuable work ever published on the subject. An Enquiry into some of the Effects of the Venereal Poison, &c. by S. Sawrey*, 1802. *Observations on the Effects of various Articles of the Materia Medica in the Cure of Lues Venerea, edit.* 2, 1807. *Practical Observations on the Natural History and Cure of the Venereal Disease*, 2 *vol.* 8vo. *edit.* 2. 1806. *Practical Observations on Venereal Complaints, by F. Swediaur, edit.* 3. *Abernethy on Diseases resembling Syphilis, in his Surgical Observations*, 1804. *Adams on Morbid Poisons, edit.* 2.

VENESECTION, (from *vena*, a vein, and *sectio*, a division.) The operation of opening a vein. *Phlebotomy.* This subject has already been spoken of in the article *Bleeding*.

VERRU'CA. A wart. (See *Wart.*)

VERTEBRÆ, DISEASE OF. In the present part of the Dictionary, I have little more to do, than insert some of the very excellent account, which Mr. Pott has left us of the affection about to be considered.

The disorder, which we are going to consider, is a disease of the spine, attended with a more, or less, com-

plete loss of the power of using the legs.

Mr. Pott mentions, that it has in general been called a palsy, and treated as a paralytic affection; to which it is in almost every respect perfectly unlike.

This author observes, that the occasion of the mistake is palpable; the patient is deprived of the use of his legs, and has a deformed incurvation of the spine; the incurvation is supposed to be caused by a dislocation of the vertebræ; the displaced bones are thought to make an unnatural pressure on the spinal marrow, and a pressure on that being very likely to produce a paralysis of some kind, the loss of the use of the legs is in this case determined to be such: the truth is, that there is no dislocation, no unnatural pressure made on the spinal marrow, nor are the limbs by any means paralytic, as will appear to whoever will examine the two complaints with any degree of attention.

In the true paralysis, (says Mr. Pott,) from whatever cause, the muscles of the affected limb are soft, flabby, unresisting, and incapable of being put into even a tonic state; the limb itself may be placed in almost any position, or posture; if it be lifted up, and then let go, it falls down, and it is not in the power of the patient to prevent, or even to retard its fall: the joints are perfectly and easily moveable in any direction; if the affection be of the lower limbs, neither hips, knees, nor ankles, have any degree of rigidity, or stiffness; but, permit the limb to be turned, or twisted, in almost any manner.

Mr. Pott next notices, that, in the present case, the muscles are indeed extenuated, and lessened in size; but, they are rigid, and always at least in a tonic state, by which the knees and ankles acquire a stiffness not very easy to overcome; by means of this stiffness, mixed with a kind of spasm, the legs of the patient are either constantly kept stretched out straight, in which case considerable force is required to bend the kness, or they are, by the action of the stronger muscles, drawn across each other, in such manner as to require as much to separate them: when the leg is in a straight position, the extensor muscles act so powerfully, as to require a considerable degree of force, to bend the joints of the knees; and, when they have been bent, the legs are immediately, and strongly, drawn up, with the heels toward the buttocks: by the rigidity of the ankle-joints, joined to the spasmodic action of the gastrocnemii muscles, the patient's toes are pointed downward, in such manner as to render it impossible for him to put his foot flat to the ground: which makes one of the decisive characteristics of the distemper.

These (says Pott) are strong marks of the distinction, which ought to be made between the two diseases; and, fully sufficient to shew the impropriety of confounding them with each other.

The majority of those, who labour under this disease, are infants, or young children: adults are by no means exempt from it; but Mr. Pott never saw it at an age beyond forty.

Mr. Pott remarks, that, when it attacks a child, who is old enough to have walked properly, its awkward and imperfect manner of using its legs, is the circumstance, which first excites attention, and the incapacity of using them at all, which very soon follows, fixes that attention, and alarms the friends.

Mr. Pott tells us, that the account, most frequently given, is, that for some time previous to the incapacity, the child had been observed to be languid, listless, and very soon tired; that he was unwilling to move much, or briskly; that he had been observed frequently to trip and stumble, although no impediment lay in his way; that when he moved hastily, or unguardedly, his legs would cross each other involuntarily, by which he was often and suddenly thrown down; that if he endeavoured to stand still, and upright, unsupported by another person, his knees would totter and bend under him; that he could not, with any degree of precision or certainty, steadily direct either of his feet, to any particular point, but, that in attempting so to do, they would be suddenly, and involuntarily brought across each other; that soon after this, he complained of frequent pains and twitchings in his thighs, particularly when in bed, and of an uneasy sensation at the pit of his stomach; that when he sat on a chair, or a stool, his legs were almost always found across each other, and drawn up under the seat; and that in a little time after these particulars had been observed, he totally lost the power of walking.

These, continues Pott, are the general circumstances, which are found, at least, in some degree, and that pretty uniformly, in most infants and children; but, there are others, which are different in different subjects.

The same author observes, that if the incurvation be of the neck, and to a considerable degree, by affecting several vertebræ, the child finds it inconvenient and painful to support its own head, and is always desirous of laying it on a table or pillow, or any thing to take off the weight. If the affection be of the dorsal vertebræ, the general marks of a distempered habit, such as loss of appetite, hard dry

cough, laborious respiration, quick pulse, and disposition to hectic, appear pretty early, and in such a manner as to demand attention: and as, in this state of the case, there is always, from the connexion between the ribs, sternum, and spine, a great degree of crookedness of the trunk, these complaints are by every body set to the account of the deformity merely. In an adult, the attack, and the progress of the disease, are much the same; but, there are some few circumstances, which may be learned from a patient of such age, which either do not make an impression on a child, or do not happen to it.

Mr. Pott states, that an adult, in a case, where no violence hath been committed, or received, will tell you, that his first intimation was a sense of weakness in his back-bone, accompanied with what he will call a heavy dull kind of pain, attended with such a lassitude as rendered a small degree of exercise fatiguing: that this was soon followed by an unusual sense of coldness in his thighs, not accountable for from the weather, and a palpable diminution of their sensibility. That in a little time more, his limbs were frequently convulsed by involuntary twitchings, particularly troublesome in the night; that soon after this, he not only became incapable of walking, but that his power either of retaining or discharging his urine and feces, was considerably impaired, and his penis became incapable of erection.

The adult also finds all the offices of his digestive, and respiratory organs much affected, and complains constantly of pain and tightness at his stomach.

Mr. Pott next continues: In infants, the curve is seldom noticed till it has got to such size and state, as to demand attention from the deformity: previous to this, all the marks of distemper, which appear in the child, pass for the effects of general weakness, and are treated as such; differently by different people, and under different circumstances, but never with any permanent good effect; some of the adventitious symptoms, if I may so call them, are, in some degree, relieved, but the principal remain in full force, or, what is much more frequent, go on increasing.

In an adult it passes for rheumatism, or gravel, or a strain, and the defect in the limbs is the first thing, that occasions an enquiry into the state of the back-bone.

When a curvature, says Mr. Pott, is perceived in an infant, it is always supposed to have received a hurt by a blow, or fall, and an adult has always recourse to some exertion in pulling, drawing, lifting, or carrying, by which the spine is thought to have been deranged, or injured; but which supposition is seldom, if ever true, in either case.

The true cause of the disease, is a morbid state of the spine, and of some of the parts connected with it; which distempered state of parts will, upon careful enquiry, be always found to have preceded the deformity some length of time; in infants, this is the sole cause, and external violence has nothing to do with it. In the adult, (continues Mr. Pott,) I will not assert, that external mischief is always and totally out of the question; but, I will venture to affirm, what is equal, as far as regards the true nature of the case, which is, that although accident and violence may in some few instances be allowed to have contributed to its more immediate appearance, yet the part, in which it shews itself, must have been previously in a morbid state, and thereby predisposed for the production of it. I do not (says Pott) by this mean to say, that a violent exertion cannot injure the spine, nor produce a paralytic complaint, that would be to say more than I know; but, I will venture to assert, that no degree of violence whatever is capable of producing such an appearance as I am now speaking of, unless the bodies of the vertebræ were by previous distemper disposed to give way; and that no supposable dislocation, caused by mere violence done to the bones of the back, which bones were, before the receipt of the injury, in a sound state, can possibly be attended with the peculiar symptoms of a curved spine. In which distinction, according to my judgment, (observes Mr. Pott,) consists the very essence of the disease. Violence may easily be supposed to bring the two vertebræ nearer to each other than they ought to be, and by crushing an intermediate one to produce a curvature; but, then the body of the vertebræ so crushed must have been in a distempered state previous to such violence: great violence may also suddenly and immediately displace a perfectly sound vertebra, from its proper and natural situation, with regard to those annexed to it: but, the necessary consequences of these two kinds of injury, must be so very different, that they never can be confounded together, or mistaken for each other even by the most inattentive observer.

Mr. Pott next acquaints us, that the true curvature is invariably uniform, in being from within outwards; but, it varies in situation, in extent, and in degree; it affects the neck, the back, or the loins; it comprehends one vertebra only, or two, or more; and as few or more are affected, or, as these are more or less morbid, and, consequently give way more or less, the

curve must be different; but, whatever variety these circumstances may admit, the lower limbs alone,* in general, feel the effect. Some are, very soon after the curvature, rendered totally and absolutely incapable, not only of walking, but of using their legs in any manner; others can make shift to move about with the help of crutches, or by grasping their thighs just above the knees with both hands; some can sit in an armed chair, without much trouble or fatigue; others cannot sit up with any help; some retain such a degree of power of using their legs, as to be able to shift their posture when in bed; others have no such power, and are obliged to be moved upon all occasions.

Mr. Pott adds, that weak and delicate children are the most frequent subjects of this distemper; and when in these, it seizes on the dorsal vertebræ, great deformity of the trunk, both before, and behind, is the almost inevitable and necessary consequence; this will be different in different persons; but, let the difference in this be what it may, it is an adjunct circumstance, and upon due enquiry it will always be found, that the curvature from within outward, preceded the other deformity, and was, at one time, the only one to be seen.

Before the alteration of figure in the back-bone has been discovered, says Mr. Pott, all the attention is paid to the limbs, in which the whole disorder is supposed to reside; and all the applications for relief are made to them: frictions, liniments, embrocations, blisters, &c. to which is generally added cold bathing and electricity; when the curvature has been noticed, recourse is immediately had to back-boards, collars, steel boddice, swings, screw-chairs, and other pieces of machinery, but all to no purpose; the patient becomes daily more and more helpless and unhealthy, languishes for more or less time, and at last dies, either in an emaciated state, from an hectic, or by a drain from an abscess, formed within the body.

That this is the case, frequent and melancholy experience evinces; but, why it is so, is perhaps not generally so well understood, or attended to as it ought to be.

Mr. Pott contends, that the primary and sole cause of all the mischief, is a distempered state of the parts composing, or in immediate connexion with the spine, tending to, and most frequently ending in, a caries of the body, or bodies, of one or more of the vertebræ: from this proceed all the ills, whether general, or local, apparent or concealed; this causes the ill health of the patient, and, in time, the curvature. The helpless state of the limbs, is only one consequence of several, proceeding from the same cause; but, though this effect is a very frequent one, and always affects the limbs in nearly the same manner; yet, the disease not having its origin in them, no application made to them only, can ever be of any possible use.

The same failure of success (observes Mr. Pott) attends the use of the different pieces of machinery, and, for reasons, which are equally obvious.

They are all, (says this author,) from the most simple, to the most complex, but particularly the swing and the screw, calculated to obviate and remove what does not exist. They are founded upon the supposition of an actual *dislocation*, which never is the case, and therefore they always have been, and ever must be, unsuccessful.

To understand this in the clearest and most convincing manner, we need only reflect on the nature of the disease, its seat, and the state, in which the parts concerned must necessarily be.

Mr. Pott states, that the bones are either already carious, or tending to become so; the parts connected with them are diseased, and not infrequently ulcerated; there is no displacement of the vertebræ, with regard to each other, and the spine bends forward only because the rotten bone, or bones, intervening between the sound ones, give way, being unable, in such state, to bear the weight of the parts above. The most superficial reflection on this, must point out to every one, why attempts of this kind can do no good, and a little more attention to the subject will shew, why they may be productive of real, and great mischief. The bones are supposed to be sound, but displaced; these machines are designed to bring them back to their former situation, and thereby to restore to the spine its proper rectitude; if, therefore, they have any power, that power must be exercised on

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* Since I began to put these papers together, (says Pott,) I have seen two cases, in one of which the arms only were affected, in the other both legs and arms.

Mr. E. Ford, of Golden-square, has favoured me with the examination and case of a lad, who lost the use of both legs, and both arms, from a curvature, which Mr. Ford cured by means of the caustics. —Mr. Parke, of Liverpool, has also obliged me with an account of two persons, both under his care, both with useless arms and legs, and both cured by the same means. (*Pott.*)

the parts in connexion with the curve; which parts, when the disease is at all advanced, are incapable of bearing such a degree of violence, without being much hurt thereby: this, if it were merely theoretical, being a conclusion drawn from the obvious and demonstrable state of the distempered parts, says Pott, could not be deemed unreasonable; but, unfortunately for the afflicted, it is confirmed by practice. They who have had patience and fortitude to bear the use of them, to such a degree as to affect the parts concerned, have always found increase of pain and fever, and an exasperation of all their bad symptoms, and (observes Mr. Pott) I have known more than one instance, in which the attempt has proved *fatal*.

The use of some or other of these pieces of machinery was so general, and the vulgar prejudice in their favour so great, that notwithstanding Mr. Pott was long convinced of their perfect inutility, yet if he had had no other objection to them, he says he would not have attempted to rob the afflicted of what they seemed to derive such comfortable expectation from. However, as he was satisfied of their mischievous effects, not only in the case of the present subject, but in many others; he could not help bearing his testimony against the indiscriminate and very improper use, which was daily made of them.

Mr. Pott says, they are used with design to prevent growing children from becoming crooked or misshapen, and this they are supposed to do, by supporting the back-bone, and by forcing the shoulders unnaturally backward; the former they cannot do, and in all cases where the spine is weak, and thereby inclined to deviate from a right figure, the latter action of these instruments must contribute to, rather than prevent such deviation; as will appear to whoever will, with any attention, examine the matter: if, instead of adding to the embarrassments of children's dress, by such iron restraints, parents would throw off all of every kind, and thereby give nature an opportunity of exerting her own powers; and if, in all cases of manifest debility, recourse was had to friction, bark, and cold bathing, with a due attention to air, diet, exercise, and rest, the children of the opulent would perhaps, stand a chance of being as stout, as straight, and as well shapen, as those of the laborious poor.

Mr. Pott observes: When a child appears to be what the common people call naturally weakly, whatever complaints it may have, are supposed to be caused by its weak state, and it is generally believed, that time and common care will remove them; but, when a curvature has made its appearance, all these marks of ill health, such as laborious respiration, hard cough, quick pulse, hectical heat and flushing, pain and tightness of the stomach, &c. are more attentively regarded, and set to the account of the deformity consequent to the curve, more especially if the curvature be of the dorsal vertebræ, in which case the deformity is always greatest: but, whoever will carefully attend to all the circumstances of this disorder, will be convinced, that most, if not all the complaints of children, labouring under this infirmity, precede the curvature, and that a morbid state of the spine, and of the parts connected with it, is the original and primary cause of both.

I have (says Pott) in the former edition, informed the reader, that my particular attention to this disease, was first excited by an instance of its being cured by a seemingly accidental abscess; that this first gave me reason to suspect, that we had mistaken an effect for a cause, and, that upon a mature deliberation upon the matter, I was still more inclined to think so, for the following reasons.

1. "That I did not remember ever to have seen this useless state of the limbs from a mere mal-formation of the spine, however crooked such mal-formation might have made it.

2. "That none of those deviations from right shape, which growing girls are so liable to, however great the deformity might be, was ever attended with this effect.

3. "That the kind of deformity, which was attended with this affection of the limbs, although it was different as to its degree, and its extent, in different people; yet, it was uniform in one circumstance, which was, that the curvature always was from within outwards.

4. "That since I had been particularly attentive to the disorder, I thought that I had observed, that neither the extent, nor degree of the curve, had in general produced any material difference in the symptoms, but that the smallest was, when perfectly formed, attended with the same consequences as the largest.

5. "That although it had sometimes happened, that a blow, or a strain, had preceded the appearance of the curve, yet it much more frequently happened, that no such cause was assignable.

6. "That I had observed exactly the same symptoms in infants, and in young children, who had neither exerted themselves, nor were supposed to have received any injury from others; and that the case was still the same in those adults, who had no such cause to look to.

7. "That although it might be expected, that a dislocation of any of the vertebræ, would be attended with symptoms of the paralytic kind, yet they would be very unlike to those which affected the limbs in the present case."

Mr. Pott next continues: The suspicions, which these circumstances had excited in my mind, were confirmed * by what I had a few opportunities of observing, in the dead bodies of some who had died afflicted with this disorder, and altogether satisfied me, that there must be something predisposing in the parts concerned; and that when we attribute the useless state of the limbs merely to the curvature, we mistake, as I have just said, an effect for a cause.

At the same time, says Mr. Pott, I gave an account of a conversation which passed between me and the late Dr. Cameron, of Worcester, who told me, that having remarked in Hippocrates, an account of a paralysis of the lower limbs, cured by an abscess in the back, he had, in a case of useless limbs, attended with a curvature of the spine, endeavoured to imitate this act of nature, by exciting a purulent discharge, and that it had proved very beneficial; which was confirmed to me by Mr. Jeffrys, of Worcester, who had made the same experiment with the same success.

If the cure of this most dreadful distemper, observes Mr. Pott, had depended upon an application to the constitution in general, it might have required a variety of medicines, the administration of which must have demanded judgment, in adapting them to particular persons and constitutions; and it must also, in the nature of things, have happened, that many individuals could not have been benefited at all. But, fortunately for the afflicted, the means of relief are simple, uniform, and safely applicable to every individual, under almost every possible circumstance, not attended by the smallest degree of hazard, and capable of being executed by any body, who has the least portion of chirurgic knowledge: it consists merely in procuring a large discharge of matter, from underneath the membrana adiposa, on each side of the distempered bones forming the curvature, and in maintaining such discharge until the patient shall have recovered his health and limbs. They who are little conversant with matters of this sort, (continues Mr. Pott,) will suppose the means very inadequate to the proposed end; but they who have been experimentally acquainted with the very wonderful effects of purulent drains, made from the immediate neighbourhood of diseases, will not be so much surprised at this particular one; and will immediately see how such kind of discharge, made, and continued from the distempered part, checks the further progress of the caries, gives nature an opportunity of exerting her own powers, of throwing off the diseased parts, and of producing, by incarnation, an union of the bones (now rendered sound,) and thereby establishing a cure.

Mr. Pott states, that it is a matter of very little importance towards the cure, by what means the discharge be procured, provided it be large, that it come from a sufficient depth, and, that it be continued for a sufficient length of time.

I have tried, says he, the different means of setons, issues by incision, and issues by caustic, and have found the last in general preferable, being least painful, most cleanly, most easily manageable, and capable of being longest continued.

The caustics, he observes, should be applied on each side of the curvature, in such a manner as to leave the portion of skin covering the spinal processes of the protruding bones, entire and unhurt, and so large, that the sores, upon the separation of the eschars, may easily hold each three or four peas, in the case of the smallest curvature; but, in large curves, at least as many more.

The issues, which modern surgeons usually make, for the relief of the symptoms arising from diseased vertebræ, are larger, than such as Mr. Pott himself was in the habit of forming. Practitioners now commonly prefer making an issue on each side of the spinous processes, about three, or four inches long, and half an inch broad. This leads me to speak of the method of making caustic issues in general, and of the best way of keeping them open.

The size of the issue, intended to be made, being determined, the place, where it is to be made, should be accurately

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* In the first edition, (says Pott,) I had described the bones, on which the disease had seized, as being enlarged and spread; upon repeated enquiry and examination, I am convinced that they are not.

The bodies of the vertebræ concerned are often affected, while the ligaments bear but little mark of distemper; but whether the ligaments be affected, or not, the bodies of the vertebræ are always diseased, which disease does not so properly *enlarge* as *erode*: the state also of the intervertebral cartilages, I find to be subject to great variety, they being sometimes totally destroyed, while the caries is small in degree, sometimes apparently but little injured, where the caries has done considerable mischief, and sometimes totally destroyed and annihilated. (*Pott.*)

marked out with ink. All the skin immediately around should then be covered with adhesive plaster, in order that it may be protected from the action of the caustic. Let the surgeon next take a piece of the kali purum, or kali purum cum calce vivâ, and wrap a little tow round one end of it, so that he may take hold of it with safety and convenience. The other end of the caustic should then be moistened a little, and rubbed very quickly on the portion of the integuments which is to be converted into an eschar. The part is to be rubbed in this manner, till it turns of a dull brown colour, when the caustic should be carefully washed off with a little wet tow, and a poultice applied.

As soon as the eschars admit of being removed, a row of peas, or beans, connected together with thread, should be laid on the sore, and confined there with sticking plaster. A compress, containing a piece of pasteboard, or sheet lead, is then to be bound over the peas, or beans, with a roller. In consequence of the continued pressure, the peas, or beans, soon form little hollows for themselves, in which they should be regularly placed every day. When the pressure is not duly maintained, the granulations are apt to rise so high, that the peas cannot be well kept on the part. In this circumstance, the surgeon must try to repress the high surface of the sore, by sprinkling on it a little of the pulvis sabinæ et æruginis æris, mixed together in equal proportions. When this plan is unavailing, the re-application of the caustic becomes indispensable.

With respect to the treatment of diseased vertebræ, Mr. Pott observes, whatever length of time it may take to obtain a complete cure, by restoring the health as well as the limbs, the issues must be continued at least as long; and in his opinion, a considerable time longer, especially in the persons of infants and growing children; the necessity of which will appear more strongly, when it shall be considered, that infants and young children of strumous habits, are the subjects, who are most liable to this distemper, and that, in all the time previous to menstruation in one sex, and puberty in the other, they are in general more served by artificial drains, than any other persons whatever.

Mr. Pott maintains, that this, and this only, does, or can, alleviate the misery attending this distemper, and in proper time effect a cure.

By means of these discharges, says he, the eroding caries is first checked, and then stopped; in consequence of which an incarnation takes place, and the cartilages between the bodies of the vertebræ having been previously destroyed, the bones become united with each other, and form a kind of anchylosis.

Mr. Pott observes, that the time necessary for the accomplishment of this, must, in the nature of things, be considerable in all cases; but, very different, according to different circumstances.

No degree of benefit or relief, nor any the smallest tendency towards a cure, is to be expected, until the caries be stopped, and the rotten bones have begun to incarn; the larger the quantity of bones concerned, and the greater degree of waste and havock committed by the caries, the greater must be the length of time required for the correction of it, and for restoring to a sound state so large a quantity of distempered parts—and vice versa.*

In the progress toward a cure, (according to Pott) the same gradation, or succession of circumstances, may be observed, as was found to attend the formation of the disease, with this difference, that those which attend the latter, are much more rapid, than those which accompany the former.

This author represents, that after the discharge has been made some time, very uncertain what, the patient is found to be better, in all general respects, and if of age to distinguish, will acknowledge, that he feels himself to be in better health; he begins to recover his appetite, gets refreshing sleep, and has a more quiet, and less hectical kind of pulse; but, the relief, which he feels above all others, is from having got rid of that distressing sensation of tightness about the stomach; in a little time more a degree of warmth, and a sensibility is felt in the thighs, which they had been strangers to for some time; and generally much about the same time, the power of retaining and discharging the urine and feces begins to be in some degree exerted.

The first return of the power of motion in the limbs, says Mr. Pott, is rather disagreeable; the motions being involuntary, and of the spasmodic kind, principally in the night; and generally attended with a sense of pain in all the muscles concerned.

At this point of amendment, if it may be so called, it is no uncommon thing, especially in bad cases, for the patient to stand some time, without making any farther progress; this, in adults, occa-

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* Nothing (says Pott) can be more uncertain than the time required for the cure of this distemper. I have seen it perfected in two or three months, and I have known it require two years; two-thirds of which time passed before there was any visible amendment.

sions impatience, and in parents, despair; but, in the milder kind of case, the power of voluntary motion generally soon follows the involuntary.

Mr. Pott next notices, that the knees and ankles, by degrees, lose their stiffness, and the relaxation of the latter enables the patient to set his feet flat upon the ground, the certain mark that the power of walking will soon follow; but those joints, having lost their rigidity, become exceedingly weak, and are not for some time capable of serving the purpose of progression.

The first voluntary motions are weak, not constantly performable, nor even every day, and liable to great variation, from a number of accidental circumstances, both external and internal.

The first attempts to walk (continues Mr. Pott) are feeble, irregular, and unsteady, and bear every mark of nervous and muscular debility; the patient stands in need of much help, and his steps, with the best support, will be irregular and unsteady; but, when they have arrived at this, this eminent surgeon had never seen an instance, in which they did not soon attain the full power of walking.

Mr. Pott adds, that when the patient can just walk, either with crutches, or between two supporters, he generally finds much trouble and inconvenience, in not being able to resist, or to regulate the more powerful action of the stronger muscles of the thigh over the weaker, by which his legs are frequently brought involuntarily across each other, and he is suddenly thrown down.

The same writer informs us, that adults find assistance in crutches, by laying hold of chairs, tables, &c. but the best and safest assistance for a child, is what is called a go-cart, of such height as to reach under the arms, and so made as to inclose the whole body: this takes all inconvenient weight off from the legs, and at the same time enables the child to move them as much as it may please.

Time and patience, says Mr. Pott, are very requisite; but, they do, in this case, as in many others, accomplish our wishes at last.

The deformity remaining after recovery, he observes, is subject to great uncertainty, and considerable variety, as it depends on the degree of caries, and the number of bones affected; in general, it may be said, that where one vertebra only is affected, and the patient young, the curve will in length of time almost totally disappear; but, where two or three are affected, this cannot be expected; the thing aimed at is the consolidation and union of the bones, which had been carious, and are now become sound; this is the *sine quâ non* of the cure, and this must, in such cases, render the curvature, and, consequently, the deformity permanent: the issues will restore the use of the limbs, but not the lost figure of the spine.

Mr. Pott, after having paid much attention to the subject, was convinced, that the complaint arises from what is commonly called a strumous, or scrophulous indisposition, affecting the parts composing the spine, or those in its immediate vicinity.

This morbid affection, says he, shews itself in a variety of forms; but, although its appearances be various, yet they are always such as determine the true nature of the distemper.

Sometimes it appears in a thickened state of the ligaments, connecting the vertebræ together, without any apparent affection of the bones.

Sometimes in the form of a distempered state of the intervertebral substances, called cartilages.

Sometimes in that of diseased glands, either in a merely indurated and enlarged state, or, what is more frequent, in that of a partial suppuration.

Sometimes it is found in the form of bags, or cysts, containing a quantity of stuff, of a very unequal consistence, partly purulent, partly sanious, and partly a curd-like kind of substance; and not unfrequently entirely of the last.

Sometimes under these bags, or cysts, even while they remain whole, the subjacent bones are found to be distempered, that is, deprived of periosteum, and tending to become carious.

Sometimes (continues Mr. Pott) these collections erode the containing membranes, and make their way downward by the side of the psoas muscle, toward the groin, or by the side of the pelvis, behind the great trochanter, or, in some cases, to the outside of the upper part of the thigh.

Sometimes (says the same author) each of the distempered states of these parts is accompanied by a greater or less degree of deformity, and crookedness of the spine, without any apparent disease of the bones composing it. Sometimes the deformity is attended with an erosion, or caries of the body, or bodies, of some of the vertebræ; and sometimes the same bones are found to be carious, without any crookedness, or alteration of figure.

Mr. Pott next acquaints us, that these different affections of the spine, and of the parts in its immediate neighbourhood, are productive of many disorders, general and local, affecting the whole frame and habit of the patient, as well as particular parts; and, among the rest, of that curvature which is the subject of this inquiry; and it may not be amiss to remark, that stru-

mous tubercles in the lungs, and a distempered state of some of the abdominal viscera, often make a part of them.

From an attentive examination of these morbid appearances, and of their effects in different subjects, and under different circumstances, Mr. Pott deduces the following observations:

1. That the disease, which produces these effects on the spine, and the parts in its vicinity, is what is in general called the scrophula; that is, that same kind of indisposition as occasions the thick upper lip, the tedious obstinate ophthalmy, the indurated glands under the chin, and in the neck, the obstructed mesentery, the hard dry cough, the glairy swellings of the wrist and ankles, the thickened ligaments of the joints, the enlargement and caries of the bones, &c. &c. &c.

2. That this disease, by falling on the spine and the parts connected with it, is the cause of a great variety of complaints, both general and local.

3. That when these complaints are not attended with an alteration of the figure of the back-bone, neither the real seat, nor true nature of such distemper are pointed out by the general symptoms, and, consequently, that they frequently are unknown, at least while the patient lives.

4. That when, by means of this distemper, an alteration is produced in the figure of the back-bone, that alteration is different in different subjects, and according to different circumstances.

5. That when the ligaments and cartilages of the spine become the seat of the disorder, without any affection of the vertebræ, it sometimes happens, that the whole spine, from the lowest vertebra of the neck downwards, gives way laterally, forming sometimes one great curve to one side, and sometimes a more irregular figure, producing general crookedness and deformity of the whole trunk of the body, attended with many marks of ill health.

6. That these complaints, which are by almost every body supposed to be the effect of the deformity merely, are really occasioned by that distempered state of the parts within the thorax, which is, at the same time, the cause both of the deformity and of the want of health.

7. That the attack is sometimes on the bodies of some of the vertebræ; and that, when this is the case, ulceration or erosion of the bone, is the consequence, and not enlargement.

8. That when this erosion, or caries, seizes the body, or bodies, of one or more of the vertebræ, it sometimes happens, that the particular kind of curvature, which makes the subject of these sheets, is the consequence.

9. That this curvature, which is always from within outward, is caused by the erosion, or destruction, of part of the body or bodies of one or more of the vertebræ; by which means that immediately above the distemper, and that immediately below it, are brought nearer to each other than they should be, the body of the patient bends forward, the spine is curved from within outward, and the tuberosity appears behind, occasioned by the protrusion of the spinal processes of the distempered vertebræ.

10. That according to the degree of carious erosion, and according to the number of vertebræ affected, the curve must be less or greater.

11. That when the attack is made upon the dorsal vertebræ, the sternum and ribs, for want of proper support, necessarily give way, and other deformity, additional to the curve, is thereby produced.

12. That this kind of caries is always confined to the bodies of the vertebræ, seldom or never affecting the articular processes.*

13. That without this erosive destruction of the bodies of the vertebræ, there can be no curvature of the kind here treated of; or, in other words, that erosion is the *sine quâ non* of this disease; that although there can be no true curve without caries, yet there is, and that not infrequently, caries without curve.

14. That the caries with curvature and useless limbs, is most frequently of the cervical or dorsal vertebræ; the caries without curve, of the lumbal, though this is by no means constant or necessary.

15. That, in the case of carious spine, without curvature, it most frequently happens, that internal abscesses, and collections of matter are formed, which matter makes its way outward, and appears in the hip, groin, or thigh; or, being detained within the body, destroys the patient: the real and immediate cause of whose death is seldom known, or even rightly guessed at, unless the dead body be examined.

16. That what are commonly called lumbal and psoas abscesses, are not infrequently produced in this manner, and, therefore, when we use these terms, we should be understood to mean only a description of the course which such matter has pursued in its way outward, or the place where it makes its appearance externally, the terms really meaning nothing

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* Mr. Pott mentions his having seen two cases in which the bodies of the vertebræ were totally separated from all connexion with the other parts, leaving the membrane, which included the spinal marrow, perfectly bare.

more, nor conveying any precise idea of the nature, seat, or origin of a distemper subject to great variety, and from which variety its very different symptoms and events, in different subjects, can alone be accounted for.

17. That contrary to the general opinion, a caries of the spine is more frequently a cause, than an effect of these abscesses.

18. That the true curvature of the spine, from within outward, of which the paralytic, or useless state of the lower limbs, is a too frequent consequence, is itself but *one* effect of a distempered spine; such case being always attended with a number of complaints, which arise from the same cause: the generally received opinion, therefore, that all the attending symptoms are derived from the curvature, considered abstractedly, is by no means founded in truth, and may be productive of very erroneous conduct.

19. That in the case of true curvature, attended with useless limbs, there never is a *dislocation*, properly to be so called; but that the alteration in the figure of the back-bone, is caused solely by the erosion and destruction of a part of one or more of the corpora vertebrarum; and, that as there can be no true curvature without caries, it must be demonstrably clear, that there must have been a distempered state of parts previous to such erosion; from all which it follows, that this distemper, call it by what name you please, ought to be regarded as the original cause of the whole, that is, of the caries, of the curvature, and all the attendant mischiefs, be they what they may, general or particular: a consideration, as it appears to me, of infinite importance to all such infants and young children, as shew, either from their general complaints, or from their shape, a tendency to this kind of evil: and whose parents and friends generally content themselves with a swing, or piece of iron machinery, and look no further.

20. That whoever will consider the real state of the parts, when a caries has taken place, and the parts surrounding it are in a state of ulceration, must see why none of the attempts, by means of swings, screws, &c. can possibly do any good, but, on the contrary, if they act so as to produce any effect at all, it must be a bad one.

21. That the discharge, by means of the issues, produces in due time (more or less under different circumstances) a cessation of the erosion of the bones; that this is followed by an incarnation, by means of which the bodies of the vertebræ, which had been the seat of the disease, coalesce, and unite with each other, forming a kind of anchylosis.

22. That the different degrees and extent of the caries, in different subjects, must render all attempts to cure uncertain, both as to the time required, and as to the ultimate event: the least and smallest degree will (every thing else being equal) be soonest relieved and cured: the larger and more extensive will require more time, and where the rottenness is to a great degree, and all the surrounding parts in a state of distempered ulceration, it must foil all attempts, and destroy the patient.

23. That when two or more vertebræ are affected, forming a large curve, however perfect the success may be with regard to the restoration of health and limbs, yet the curvature will and must remain, in consequence of the union of the bones with each other.

24. That the useless state of the limbs is by no means a consequence of the altered figure of the spine, or of the disposition of the bones with regard to each other, but merely of the caries: of this truth there needs no other proof, than what may be drawn from the cure of a large and extensive curvature, in which three or more vertebræ were concerned: in this the deformity always remains unaltered and unalterable, notwithstanding the patient recovers both health and limbs.

Upon the whole, after due consideration of what has been said concerning the nature of the complaint, its producing cause, and the method by which it is capable of being cured, Mr. Pott says, he would ask, whether the diseased state of the spine, and of the parts connected with it, (which, if not prevented, must produce some of its very dreadful effects,) may not, by a timely use of proper means, be prevented?

He contends, that a morbid state of the parts, previous to deformity, caries, or curve, must be allowed: every complaint of the living, and every appearance in the dead, he says, prove it beyond contradiction or doubt. All the general complaints of persons, afflicted with this disorder, will always, upon careful inquiry, be found to have preceded any degree of deformity, to have increased as the curve became apparent, and to have decreased as the means used for relief took place: the pain and tightness about the stomach, the indigestion, the want of appetite, the disturbed sleep, &c. &c. gradually disappear, and the marks of returning health become observable, before the limbs recover the smallest degree of their power of moving.

Mr. Pott remarks, that on the other hand, it is as true, that when from extent, or degree, or inveteracy of the caries, the issues are found to be unequal to the

wished-for effect, the general complaints receive no amendment; but increase until the patient sinks under them.

If all this be true, says Mr. Pott, which that it is, the manifold and repeated experience of many, as well as myself, can amply testify; and if it be found, that the issues are capable of effecting a perfect cure, even after a caries has taken place, and that to a considerable degree, which is also true to demonstration, is it not reasonable to conclude, that the same means, made use of in due time, might prove a preventive?

If this was a matter of mere speculation, or opinion, observes this celebrated surgeon, I would be very cautious how I spake on the subject; but it is really a matter of experiment; and as far as I have had it in my power to put it to that test, it has succeeded, by the restoration of lost health, and the prevention of a deformity, which was advancing rapidly.

It may, perhaps, be said, continues Mr. Pott, that if no such means had been used, the same space of time might have produced the same effect: to this it is impossible to make an answer. I shall, therefore, content myself with having given my opinion, with the circumstances and reasons on which it is founded.

Mr. Pott concludes: I should be sorry to be misunderstood on this point, or to have it thought, that I meant to say, that every weak or ricketty child was necessarily liable to a curved spine; or that issues were to be deemed an infallible remedy for the ills arising from a strumous habit: far be it from me to say either: what I would wish to be understood to mean is, that such kind of habit appears to me to be most apt to produce some of the mischiefs mentioned in this tract: that, as a purulent discharge, derived from the neighbourhood of the spine, is found, from repeated experience, to be a successful remedy, even after the disease is confirmed by a caries, it seems to me to bid fairer than any thing else, if used in time, to become a preventive; and, that as some other kinds of deformity are found to follow attacks of the same kind of constitutional disorder, seizing on these parts, and which, though not causing precisely the same effect, are nevertheless attended with the same general symptoms; I cannot help thinking, that it may be well worth while to try whether benefit be not obtainable by the same means, in the one case as in the other; and if the old maxim, "*anceps remedium quam nullum*" be admissible, surely an experiment, which is in its nature perfectly incapable of harm, is worth making. (*Pott on the Palsy of the Lower Limbs.*)

VERTIGO. (from *verto*, to turn, because all things seem to turn round.) A giddiness of the head; a symptom of several diseases.

VINEGAR. For an account of its uses in surgery, see *Acetum*.

VIPER, BITE OF. See *Wounds*.

VOLVULUS. (from *volvo*, to roll up.) See *Intussusception*.

W.

WART. Mr. Hunter observes, that a wart appears to be an excrescence from the cutis, or a tumour forming upon it, by which means, it becomes covered with a cuticle, which is either strong and hard, or thin and soft, just as the cuticle is, which covers the parts, from which the excrescence arises. Warts are radiated from their basis to their circumference. The surface of the radii appears to be pointed, or granulated, like the surface of healthy granulations, with the exception of being harder, and rising higher. The surface, on which a wart is formed, seems only to be capable of producing one; for, the surrounding and connecting surface does not throw out a similar substance. Thus, when a wart has once begun to grow, it rises higher and higher, without becoming larger at its basis. Such excrescences seem to have within themselves the power of growing larger; for, as Hunter remarks, after they have risen above the surface of the skin, on which their basis cannot grow larger, they swell out into a round thick substance, which becomes rougher and rougher.

In consequence of having this structure, warts are very liable to be hurt by bodies rubbing against them, and, from such a cause, they often bleed very profusely, and are rendered very painful. (*Treatise on the Venereal Disease, p. 250, Edit. 2.*)

As warts are adventitious substances,

and not any part of the original structure of the body, their powers of life are weak. Hence, when stimulated by particular applications, these excrescences generally become smaller and smaller, and, at length, altogether disappear, or drop off.

On this principle, warts may frequently be cured by stimulating them with a powder, composed of ærugo æris and savine leaves, in equal proportions.

However, the employment of escharotics; the removal of such excrescences with a knife or pair of scissars; or tying their necks with a ligature; is a mode frequently preferred, because the cure is sooner accomplished.

The two last methods are certainly particularly eligible, when the wart has a narrow neck; but, after the removal of the excrescence, it is still proper to touch the root with caustic; for, unless the whole be completely destroyed, the wart will inevitably grow again.

With respect to caustics, the practitioner may use the kali purum cum calce vivâ, the argentum nitratum, or the cuprum vitriolatum. I think a strong solution of the argentum nitratum is as efficacious an application of the caustic kind, as apy, which can be used in these cases.

Warts on the pudenda, and about the anus, which are often supposed to be venereal, scarcely ever withstand the effect of the powder of savine, and ærugo æris.

WHITLOW. (*Panaris, Panaritium, Paronychia.*) A whitlow is an inflammation, which occurs about the end of the finger, and is exceedingly painful, and very much disposed to suppurate. The affection is commonly seen attacking the fingers, but the toes are undoubtedly, in a few instances, the seat of the disease.

Writers usually divide whitlows into four kinds, or degrees.

The first one is the mildest. In this case, a vesicle, filled with matter, commonly arises near the root, or side of the nail, after a preceding superficial inflammation of trivial extent. The matter is situated immediately under the cuticle. Sometimes the abscess takes place under the nail, in which case, the pain is very severe, and not unfrequently shoots upward as far as the external condyle.

The second kind of whitlow is chiefly situated in the cellular substance under the cutis, and, for the most part, occurs at the very end of the finger. In this sort of case, the inflammatory symptoms, especially the pain, are far more violent, than they usually are in inflammations of such little extent. However, although the pain is thus severe, it does not in general extend far from the part affected, unless the tendon partake of the inflammation. Writers usually impute the violence of the pain, and the inconsiderable degree of inflammation attending the complaint, to the hard and unyielding nature of the skin on the finger. To the same cause they also ascribe the difficulty of perceiving any fluctuation, after matter has formed; and the slowness, with which the pus makes its way outward.

The third kind of whitlow is distinguishable from the others by the following circumstances. With the most excruciating pain, there is very little swelling in the affected finger, but, a vast deal in the hand, particularly, about the wrist, and over the whole fore-arm. The pain extends to the hand, wrist, elbow, and even the shoulder. When suppuration has taken place, a fluctuation can never be felt in the affected finger, though the undulation of matter may very often be distinctly perceived in the hand, at the wrist, or even somewhere in the fore-arm. The case is frequently accompanied with a considerable degree of fever. In this species of whitlow, the disease is seated in the tendons and their sheaths, and the power of moving the fingers, and even the whole hand, is lost.

Authors describe the fourth kind of whitlow, as arising principally from an inflammation of the periosteum. The case is attended with one peculiarity, which is, that, however violent the pain may be, it never extends to the hand, and fore-arm, nor is there any external swelling of the affected finger. Suppuration generally very soon follows, the usual consequence of which is a caries of the subjacent finger-bones.

Whitlows commonly begin on the inside of the fingers; but, they do occasionally commence on the back of these parts, and even on that of the hand. Though pain about the wrist is usually the effect of the inflammation in the finger, yet Acrel makes mention of a case, in which the disorder was altogether confined to the hand itself. (*Vorfälle, 2 B. p.* 191.)

Besides the above species of whitlows, Richter takes notice of a very painful affection of the finger, that has been termed the *dry* whitlow. Acrel relates, that a man, without any particular preceding cause, was seized with a very violent darting pain, near the nail of the little finger. The pain sometimes ceased for a few minutes, or hours, and then recurred and lasted for weeks, and months.

At length, it became still more intolerable and unremitting, and extended all up the arm. Hence, the removal of the first painful portion of the finger was determined on. Nothing unnatural was

found in the appearance of the integuments and tendons; but, the texture of the bone was quite destroyed, and changed into a fatty substance. (*Acrel, Vorfälle*, 2 *B. p.* 210.)

The causes of whitlows are generally of a local nature. Writers enumerate the following as the most common ones: a contusion; suddenly warming the finger when it is exceedingly cold; pricks with needles, or other sharp instruments; and the insinuation of irritating matter into scratches on the finger. A surgeon, in operating for a fistula in ano, has been known to cut his finger, and have in consequence of the accident a very severe and dangerous kind of whitlow. Richter also mentions a person having had a most obstinate whitlow, in consequence of getting a slight wound on the finger, in examining the head of a horse, that had the glanders. Sometimes, the cause of a whitlow depends on a splinter, which still continues lodged in the part. Very often, no particular cause whatever can be assigned for the complaint.

The different kinds of whitlows are not all to be treated in the same manner.

The first case, which occurs about the root of the nail, ought to be opened as soon as possible. When this plan is not adopted, the matter not only makes its way round the nail, but penetrates more deeply, so as to reach the root of the nail, and occasion a loss of the part. When an effectual opening is not made, the matter is apt to collect again. In general, a detachment of the cuticle takes place, as far as the abscess extends. When the inflammation has been very violent, and the matter has made its way as far as the root of the nail, the nail itself is in general gradually detached, while the denuded portion of the root of the nail acts on the sore as a foreign body, and hinders it from healing. Hence, the surgeon should repeatedly cut away as much of the lower edge of the nail as he can, and insinuate a little soft lint between the margin of the nail and the sore, in order to keep the latter from being irritated by the former. In proportion as the old nail gradually separates, a new one makes its appearance.

When matter lies under the nail, an opening should be made through the part, as speedily as possible, for the discharge of the abscess. In order to perform this operation, Richter advises the surgeon to scrape, with a piece of glass, the part of the nail to be opened, till it is as thin as it can well be, and then to cut through it with the point of a bistoury.

In the second species of whitlow, suppuration may sometimes be prevented, and the inflammation be resolved, by the timely employment of proper means. When the pain is exceedingly violent, and there is acute fever, it may be advisable to bleed the patient in the arm. In a few severe cases, the application of three, or four leeches to the affected finger, has been known to procure prompt relief. (*Schmucker.*) Theden thinks, that applying a roller round the finger, hand, and arm, and frequently wetting the two first parts with a lotion, the most certain means of resolving the inflammation. Platner advises the finger to be for some time immersed in water, as warm as the patient can bear. Some recommend the external use of camphorated spirit, or the volatile alkali; while others advise the affected finger to be plunged in a very warm solution of soap, or kali. When the whitlow has been occasioned by a prick, particular care must be taken, that there is no extraneous substance remaining in the puncture.

When the symptoms do not lessen by the fourth day, Richter recommends making an opening in the finger. Even when no fluctuation is discovered, the same surgeon approves of making a crucial incision in the seat of the pain, and, he states, that although no matter may be discharged, the patient always derives infinite relief from the operation. The benefit, he says, may either be imputed to the bleeding, or to the division of the hard tense skin, which compresses the subjacent inflamed parts. Sometimes, the collection of matter can be plainly felt, and, in this case, there can be no hesitation about the place, where the opening should be made. However, it may be proper to remark, that the opening should always be made sufficiently large. When the surgeon makes a small puncture, it very soon closes again, and a repetition of the operation becomes necessary. When opening the abscess is delayed, the theca of the flexor tendons easily becomes affected, or the matter may make its way to a considerable extent around under the skin. Sometimes, the matter gets through the cutis by ulceration, and elevates the cuticle, in the form of a pustule. In this case, as soon as the cuticle has been opened, a director should be introduced into the aperture in the skin, and the latter opening be enlarged with a bistoury.

The third species of whitlow seldom affects the last phalanx of the fingers; but, generally, the second, or third one. In this case, Richter enjoins us never to defer making an opening longer, than the third day. If we wait till suppuration happens, we shall wait till the tendons are destroyed, and the use of the finger lost. In the case under considera-

tion, the matter is always of a bad quality, and very small in quantity. A fluctuation in the finger can very seldom be felt. However, in a very few instances, the matter becomes perceptible at the extremity of the finger, or about the finger-joints, but, more often, in the palm of the hand, or near the wrist. In these circumstances, the tendons are in general already destroyed, and a stiffness of the finger and hand is to be apprehended. When the complaint is the consequence of a puncture, the best plan, according to Richter, is at once to enlarge the wound; for, in this sort of case, all other methods are quite unavailing. It is not enough, however, to cut through the skin; the tendinous theca itself must be laid open.

When the pain does not undergo any diminution, after the tendinous sheath has been opened, or, should the pain, after subsiding, recur again, the first opening should be dilated by means of a knife and director. Also, if the patient should experience in any other part of the hand an acute pain, which does not diminish in consequence of this first opening; or if signs of the formation of matter should be observed elsewhere in the hand; an opening should be made there, of sufficient depth to reach through the theca of the flexor tendons. When a collection of matter forms towards the wrist, or the patient feels violent pain in that situation, an opening must also be made there. If an opening should have been already made in the hand, a probe may be introduced into the wound, and another aperture made in an eligible situation by cutting on the end of the instrument. In the same way, Richter advises making an opening in any part of the fore-arm, where great pain, or the symptoms of suppuration, indicate.

In the fourth kind of whitlow, early incisions, made down to the bone, are the most certain means of obviating the danger. When such incisions are not made early enough, suppuration takes place, and the bone becomes carious. The cut is to be made in the place, where the pain is most severe. When the first phalanx is affected, the incision may be made in front of the finger; but, when the second, or third, is the seat of the complaint, the opening had better be made on one side. However, in order that the opening may be at all useful, it is absolutely necessary to make it down to the bone. When the incision has been delayed too long, a small quantity of unhealthy matter is usually detected, and the bone is found to be carious. As an exfoliation can hardly be expected in this situation, it is best to remove the diseased piece of bone at once, which can generally be effected without difficulty. When the last phalanx alone is affected, the finger retains its form, with the exception of its end being a little shorter and flatter. When the disease, however, is situated in the third phalanx, Richter thinks it better to amputate the finger than remove the diseased bone, as the finger, if left, would always remain stiff and unserviceable. (See *Anfangsgr. der Wundarzneykunst, vol.* 7.)

WOUNDS. A great deal of the subject of wounds is already treated of in several parts of this work; for instance, the articles *Abdomen*; *Hydrophobia*; *Gun-shot Wounds*; *Head, Injuries of*; *Parotid Duct*; *Sutures*; *Thorax*; *Throat*, &c.

A wound may be defined to be a recent solution of continuity in the soft parts, suddenly occasioned by external causes.

Wounds in general are subject to a great deal of variety, both in their nature and external appearance. The differences depend, in a very great measure, on the nature of the injured parts, the manner in which the wound has happened, and its extent.

Wounds of fleshy parts are exceedingly different from those of tendinous ones, both in regard to their appearance, and nature, and the degree of danger. There is also an essential difference, between such as are made with a sharp cutting instrument, and others, in which the fibres, besides being divided, have suffered considerable contusion and laceration. A wound, made with a narrow-pointed instrument, is also of a very different nature from one that has an ample orifice.

Wounds are distinguished by surgical writers into several kinds, viz. *incised, punctured, contused, lacerated, and poisoned ones, and gun-shot injuries.*

The latter cases have been treated of in the article *Gun-shot Wounds*; but, of the other kinds of wounds, we shall presently treat.

The degree of danger, attending every wound, depends very much on some of the following circumstances. The extent of the injury; the additional violence, which the fibres of the part have suffered, besides their division; the nature of the blood-vessels, or nerves, which happen to be cut; the nature of the wounded part, in respect to its general power of healing favourably, or not; whether the operations of the system at large, and life itself, can be well supported, or not, while the functions of the wounded part are disturbed, interrupted, or suspended, by the accident; the age of the patient; the goodness, or badness of his constitution; and the opportunities, which there

may be, of receiving proper surgical aid, and assistance of every kind.

INCISED WOUNDS.

As a general observation, we may state, that, *cæteris paribus*, a wound, which is made with a sharp cutting instrument, which is, in short, a mere incision, is attended with less hazard of dangerous consequences, than any other kind of wound whatever. The fibres have only been simply divided; they have suffered no contusion, nor laceration; they are consequently less likely to inflame much so as to suppurate, and slough; and they commonly admit of being united again in a very expeditious manner.

Simple incised wounds commonly bleed more freely, than contused and lacerated ones, which at first frequently emit no blood at all, although considerable blood-vessels may be injured. But, this circumstance, apparently diminishing the danger of contused and lacerated wounds, is deceitful, and serves rather to render the case in reality more perilous, by inducing the inexperienced practitioner to be off his guard against hemorrhage. Certainly, it often happens, that, on the immediate occurrence of such wounds, there is no bleeding of consequence. However, the side of some large artery having suffered great violence at the time of the accident, it may ulcerate, or slough, a week or ten days afterwards, and an alarming, and even fatal effusion of blood be the result.

This unpleasant occurrence of sudden hemorrhage is particularly apt to occur in cases of gun-shot wounds, which are injuries always attended with a considerable degree of contusion and laceration.

In cases of simple incised wounds, the bleeding, which at once takes place from all the divided vessels, is a source of very useful information to the surgeon, inasmuch as it enables him to judge, what danger is to be apprehended from the hemorrhage, whether the cut vessels are large enough to demand the ligature, or, on the contrary, whether they are such as will cease to bleed, either by slight pressure, or of their own accord.

A surgeon, called to a recent simple incised wound, has three objects which he should endeavour to accomplish, without the least delay. The first, and that, which requires his immediate interference, is the bleeding, which must be checked. The second is the removal of all extraneous matter from the surface of the wound. The third object is to unite the opposite sides of the injury.

When the divided vessels are not above a certain size, the bleeding soon spontaneously ceases, and no surgical measures need be taken on this particular account. When the wounded vessels are even somewhat larger, and their situation is favourable for compression with a bandage, it is often advisable to close the wound and apply compresses and a rolier, rather than have recourse to ligatures, which always create a certain degree of suppuration. However, though I have made this observation, I should be exceedingly sorry to appear at all against the general preference to ligatures, whenever the wounded arteries are above a certain magnitude. In this circumstance, tying the bleeding vessels is the only safe mode of proceeding. When the artery is of considerable size, and its mouth can be readily seen, the most proper instrument for taking hold of it, is a pair of forceps. In applying the ligature, the surgeon must take care to pull its end in such a manner, that the noose will not rise above the mouth of the vessel, and for the purpose of altering the direction of the force employed in tightening the ligature, the ends of the thumbs are generally made use of. The tenaculum is commonly employed for taking up arteries, which are not exceedingly large and distinct. However, I need not expatiate on the mode of tying arteries, as the subject is fully considered in another part of the Dictionary. See *Hemorrhage*.

The bleeding having been suppressed, the next object is to remove any extraneous matter, such as dirt, bits of glass, clots of blood, &c. from the surface of the wound. Were this circumstance neglected, the plan of uniting the opposite sides of the cut by the adhesive inflammation, or by, what is more frequently termed, union by the first intention, would in general be frustrated.

As soon as the foregoing indications have been attended to, the surgeon must approximate the lips of the wound, put them in contact, and take proper precautions for keeping them in this state, until they have firmly grown together. The sides of wounds are kept in a state of apposition by the aid of adhesive plaster, a proper position, the pressure of a roller, and, in a few particular instances, by the employment of sutures. Of this last means, nothing need be said in this article, as all the requisite information may be found in another place. See *Sutures*.

The best and most common method of keeping the surfaces of divided parts in contact is by means of strips of adhesive plaster. At the time, when they are to be applied, the surgeon should put the wounded parts in such a position, as

shall render them capable of being brought into a state of apposition with most facility. With this view, a position should generally be chosen, which relaxes the skin and subjacent muscles. An assistant should then place the edges of the wound as evenly together as possible, and hold them in this state, until the surgeon has secured them in this condition by strips of adhesive plaster, applied across the line of the wound. In general, it is deemed advisable to leave a small interspace of about a quarter of an inch between each two strips of plaster, by which means, the matter cannot be confined in case of suppuration. Over these first strips, lint is to be applied, and kept in its place with some more pieces of adhesive plaster. Then, if necessary, a pledget, and compresses are to be put on the part, and, lastly, the bandage, or roller, is to be applied.

In this manner, the fresh-cut surfaces are brought into contact, and to preserve them quietly in this state, is the next great aim, which the surgeon should have in view. The wounded part should be laid in the posture, which was found the most favourable for approximating the sides of the cut, at the time of applying the dressings, and the patient should be directed to keep the part in a perfectly quiet state.

When attention is paid to these circumstances, it often happens, that the two opposite surfaces of the wound grow together again in the course of forty-eight hours, without the occurrence of the least degree of suppuration. The process, by which this desirable event is accomplished, is well known among surgeons, by the name of *union by the first intention*. Besides the advantage of the cure being effected in this way with the greatest expedition possible, there is still another thing much in favour of always promoting this method of healing wounds, which is, that the scar is much less, than after any other plan, and the part is covered with original skin, which is always much stronger, than any which can be formed as a substitute for it.

It is wonderful with what celerity union by the first intention takes place under favourable circumstances. In the course of three days, the large wound, made in the operation of amputation, is frequently all healed, except just where the ligatures are situated.

When the two sides of the wound have been brought together, before the oozing of blood has entirely ceased, it is probable, that blood itself becomes the first bond of union, and this connection must happen indeed almost immediately. In other instances, what Mr. Hunter called the adhesive inflammation occurs. In this process, coagulating lymph either issues from the half-closed mouths of the vessels, or from the surface of the opened cells of the cellular substance. This becomes the first uniting medium, and, very soon afterwards, in some inexplicable manner, a vascular intercourse is established between the opposite sides of the wound.

The power, which parts of the animal body have, of growing together in the above manner, is strikingly evinced by the possibility of removing a part of one body, and then uniting it to some part of another. In this latter case, there can be no assistance given to the union on one side, since the detached part, as Mr. Hunter observes, can hardly do more, than just preserve its own living principle, and accept of union. In this way, says the same writer, the spurs of the young cock can be made to grow on his comb, or on that of another cock; and its testicles, after having been removed, may be made to unite to the inside of any cavity of an animal.

Mr. John Bell describes the process of adhesion to be this: either the arteries of the opposite surfaces inosculate mouth to mouth, or rather each cut-surface throws out a gluten; the gluten fills up the intermediate space; into that gluten, the lesser arteries of each cut-surface extend themselves, and it is thus, perhaps, by the generation of a new intermediate substance, that the continuity and entireness of the part are so quickly restored. If any one point fail to adhere, there the wound must run into suppuration; because, says Mr. J. Bell, at that point there is a separation of parts, which is equivalent to a loss of substance.

The same writer observes, that there are, no doubt, accidents, both of the constitution and the wound, which will prevent adhesion. If the patient be of a bad habit of body; if he be lying in a foul hospital, in the midst of putrid sores, and breathing a contagious air; if he be ill of a fever, or flux, or any general disease; then the properties of the body being less perfect, the wound will not adhere. Mr. J. Bell also notices, that, if the wound be foul, made with a poisoned weapon, or left with foreign bodies lodged in it; or if a considerable quantity of blood be poured out into the cavity of the wound; or if there be a wounded lymphatic, or a wounded salivary duct, a wounded intestine, or a bleeding artery or vein, the immediate adhesion of the whole of the wound may be prevented. However, I cannot help remarking, that, though Mr. John Bell, in imitation of most surgical writers, sets down the

wound of a lymphatic, as preventive of the union of wounds, I cannot say, that I ever saw such an effect imputable to the cause just mentioned. Also, when an artery, or vein is cut, and requires being tied, the adhesion of the wound would only be prevented just where the ligature lies.

There is no wound, observes Mr. John Bell, in which we may not try with perfect safety to procure this adhesion; for, nothing can agree better with one surface of the wound, than the opposite one, which has been just separated from it. They may immediately adhere together, and even if they should not do so, no harm is done, and the wound will yet suppurate as favourably, as if it had been roughly dressed with dry caddis, or some vulnerary balsam, or acrid ointment. If one part should suppurate, while one half adheres, then, says Mr. John Bell, one half of our business is done. In short, this simple duty of immediately closing a wound is both natural and safe. (*Discourses on the Nature and Cure of Wounds, vol.* 1.)

Sometimes, the attempt to procure an union by the first intention fails, even in cases of incised wounds. The moment, where we observe pain, inflammation, and swelling of the wound, a separation or gaping of its lips, the stitches tense (when these have been used), and the points, where the stitches pass, particularly inflamed, Mr. John Bell advises us to undo the bandages, draw out the sutures, and take away every thing, which acts like a stricture on the wound. These prudent measures, he observes, may abate the rising inflammation, and prevent the total separation of the skin, while an endeavour may still be made to keep the edges of the wound tolerably near each other by the more gentle operation of sticking plasters.

However, when the inflammation rises still higher, and it is evident that a total separation of the sides of the wound cannot be avoided, the above author recommends leaving the parts quite loose, and applying a large soft poultice; for, says Mr. John Bell, should you, in this critical juncture, persist in keeping the parts together with sutures, the inflammation, in the form of erysipelas, would extend over the whole limb, attended with a fetid and bloody suppuration. After the wound has got into a favourable state, another attempt may now be made to bring the edges near each other, not with sutures, but, strips of adhesive plaster, or the gentle application of a bandage.

Mr. John Bell concludes with remarking, that the suppuration, production of granulations, and all that follows, are the work of nature. The only thing, that the surgeon can usefully do, is to take care of the health. When the wound does not suppurate favourably, the discharge generally becomes profuse, thin, and gleety. This state is to be amended by bark, wine, rich diet, and good air.

I shall conclude this subject of union by the first intention with an extract from the writings of Mr. Hunter, who observes that

"It is with a view to this principle of union, that it has been recommended to bring the sides (or lips) of wounds together; but as the natural elasticity of the parts makes them recede, it has been found necessary to employ art for that purpose. This necessity first suggested the practice of sewing wounds, and afterwards gave rise to various inventions in order to answer this end, such as bandages, sticking-plasters, and ligatures. Among these, the bandage commonly called the uniting bandage is preferable to all the rest, where it can be employed; but its application is very confined, from being only adapted to parts where a roller can be used. A piece of sticking-plaster, which has been called the dry suture, is more general in its application than the uniting bandage, and is therefore preferable to it on many occasions.

"I can hardly suppose (says Mr. Hunter) a wound, in any situation, where it may not be applied, excepting penetrating wounds, where we wish the inner portion of the wound to be closed equally with the outer, as in the case of hair-lip. But even in such wounds, if the parts are thick, and the wound not large, the sides will seldom recede so far as to make any other means necessary. The dry suture has an advantage over stitches, by bringing a larger surface of the wound together, by not inflaming the parts to which it is applied, and by neither producing in them suppuration nor ulceration, which stitches always do. When parts, therefore, can be brought together, and especially where some force is required for that purpose, from the skin not being in large quantity, the sticking plaster is certainly the best application. This happens frequently to be the case after the removal of tumours, in amputation, or where the sides of the wound are only to be brought together at one end, as in the hare-lip; and I think the difference between Mr. Sharp's cross-stitch, after amputation, as recommended in his Critical Enquiry, and Mr. Allanson's practice, shews strongly the superiority of the sticking-plaster (or dry suture). In those parts of the body where the skin recedes more than in others, this treatment becomes most necessary; and as the scalp proba-

bly recedes as little as any, it is therefore seldom necessary to apply any thing in wounds of that part; the practice will certainly answer best in superficial wounds, because the bottom is in these more within its influence.

"The sticking-plasters should be laid on in strips, and these should be at small distances from each other, viz. about a quarter of an inch at most, if the part requires close confinement; but when it does not, they may be at greater distances. This precaution becomes more necessary if the bleeding is not quite stopped; there should be passages left for the exit of blood, as its accumulation might prevent the union, although this does not always happen. If any extraneous body, such as a ligature, should have been left in the wound, suppuration will take place, and the matter should be allowed to vent at some of those openings, or spaces, between the slips of plaster. I have known a very considerable abscess formed in consequence of this precaution being neglected, by which the whole of the recently united parts has been separated.

"The interrupted suture, which has generally been recommended in large wounds, is still in use, but seldom proves equal to the intention. This we may reckon to be the only one that deserves the name of suture; it was formerly used, but is now in a great measure laid aside in practice, not from the impropriety of uniting parts by this process, but from the ineffectual mode of attempting it. In what manner better methods could be contrived, I have not been able to suggest. It is to be understood, that the above methods of bringing wounded parts together, in order to unite them, are only to be put in practice in such cases as will admit of it; for if there was a method known, which in all cases would bring the wounded surfaces into contact, it would, in many instances, be improper, as some wounds are attended with contusion, by which the parts have been more or less deadened; in such cases, as was formerly observed, union cannot take place according to our first principle, and therefore it is improper to attempt it.

"In many wounds, which are not attended with contusion, when we either know, or suspect, that extraneous bodies have been introduced into the wound, union by the first intention should not be attempted, but they should be allowed to suppurate, in order that the extraneous matter may be expelled. Wounds, which are attended with laceration, although free from contusion, cannot always be united by the first intention, because it must frequently be impossible to bring the external parts, or skin, so much in contact, as to prevent that inflammation which is naturally produced by exposure. But even in cases of simple laceration, where the external influence is but slight, or can be prevented (as we observed in treating of the compound simple fracture) we find that union by the first intention often takes place; the blood, which fills up the interstices of the lacerated parts, having prevented the stimulus of imperfection in them, and preventing suppuration, may afterwards be absorbed.

"Many operations may be so performed as to admit of parts uniting by the first intention; but the practice should be adopted with great circumspection: the mode of operating with that view, should in all cases be a secondary, and not a first consideration, which it has unluckily been too often among surgeons. In cases of cancer, it is a most dangerous attempt at refinement in surgery.

"In the union of wounded parts by the first intention, it is hardly or never possible, to bring them so close together at the exposed edges, as to unite them perfectly by these means; such edges are therefore obliged to take another method of healing. If kept moist, they will inflame as deep between the cut surfaces as the blood fails in the union, and there suppurate and granulate; but if the blood be allowed to dry and form a scab between, and along the cut edges, then inflammation and suppuration of those edges will be prevented, and this will complete the union, as will be described by-and-by.

"As those effects of accidental injury, which can be cured by the first intention, call up none of the powers of the constitution to assist in the reparation, it is not the least affected or disturbed by them; the parts are united by the extravasated blood alone, which was thrown out by the injury, either from the divided vessels, or in consequence of inflammation, without a single action taking place, even in the part itself, except the closing, or inosculation of the vessels; for the flowing of the blood is to be considered as entirely mechanical. Even in cases where a small degree of inflammation comes on, it is merely a local action, and so inconsiderable, that the constitution is not affected by it; because it is an operation to which the powers belonging to the parts themselves are fully equal. The inflammation may produce a small degree of pain, but the operation of union gives no sensation of any kind whatever." (*Hunter on the Blood, Inflammation, and Gunshot Wounds.*)

CONTUSED AND LACERATED WOUNDS.

Lacerated wounds are those, in which

the fibres, instead of being divided by a cutting instrument, have been torn asunder by some violence, capable of overcoming their force of adhesion. The edges of such wounds, instead of being straight and regular, are jagged and unequal.

The term *contused* is applied to those wounds, which are occasioned by some blunt instrument, or surface, which has violently struck a part of the body.

These two species of wounds greatly resemble each other, and as they require nearly the same kind of treament, writers usually treat of them together.

Lacerated, and contused, wounds differ from simple incised ones in appearing, at first view, much less alarming, than the latter, while, in reality, they are infinitely more dangerous. In simple cut wounds, the retraction of the parts, and the hemorrhage, are generally much more considerable, than in a lacerated wound of the same size. However, notwithstanding these circumstances, they commonly admit of being healed with by far the greatest ease. It is even proper to remark, that lacerated and contused wounds are scarcely ever attended with any serious effusion of blood, even though some large blood-vessels may be injured. This circumstance often leads inexperienced practitioners to commit great mistakes, by inducing them to promise too much in the prognosis, which they make. Surgeons, versed in practice, however, do not allow themselves to be deceived by the absence of hemorrhage, and, in proportion as there is little bleeding, they apprehend that the violence, done to the fibres and vessels has been considerable. Whole limbs have frequently been torn from the body, without any hemorrhage of consequence taking place.

Cheselden has described, in the Philosophical Transactions, a very remarkable case, in which a man's arm was suddenly torn from his body. Samuel Wood, a miller, had round his arm a rope, which got entangled with the wheel of a mill. He was lifted off the ground, and then stopped by a beam, which prevented his trunk from passing further, at this instant, the wheel, which was moving with immense force, completely tore, and carried away, his arm and scapula from his body. The appearance of a wound, occasioned in this manner, must of course be horrible, and the first idea, thence arising, must naturally be that the patient cannot possibly survive. Samuel Wood, however, escaped with his life. The limb had been torn off with such velocity, that he was unaware of the accident, till he saw his arm moving round on the wheel. He immediately descended by a narrow ladder from the mill, and even walked some paces, with a view of seeking assistance. He now fell down from weakness. The persons who first came to his assistance, covered the wound with powdered sugar. A surgeon, who afterwards arrived, observing that there was no hemorrhage, was content with bringing down the skin, which was very loose, so as to make it cover the surface of the wound. For this purpose, he used two cross-stitches. The patient was conveyed, the next day, to St. Thomas's Hospital, and put under the care of Mr. Fern, who was then the head surgeon of that charity. This practitioner employed the means usually resorted to, with a view of preventing the bad symptoms to be apprehended in this sort of case. The first dressings came away without any bleeding; no alarming consequences ensued; and the patient got completely well in the course of a couple of months.

When the arm was examined, it was found, that the muscles, inserted into the scapula, were torn through near their insertions; while other muscles, arising from this bone, were carried away with it. The skin, covering the scapula, had remained in its natural situation, and seemed as if it had been divided precisely at the insertion of the deltoid muscle.

In La Motte's *Traité des Accouchemens*, may be found an account of a little boy, who, while playing near the wheel of a mill, got his hand, fore-arm, and arm, successively entangled in the machinery, and the limb was violently torn away at the shoulder joint, in consequence of the lad's body not being able to pass in the direction, in which the arm was drawn. The bleeding was so trivial, that it was stopped with a little lint, and the boy very soon recovered.

In the fifth volume of the Edinburgh Medical Commentaries, may also be perused the history of a child, three years and a half old, which had its arm torn off by the wheel of a mill. Mr. Carmichael, who saw the child about an hour after the accident, found it almost in a dying state, with cold extremities, small faultering pulse, and all the right side of the body convulsed. However, there had been hardly any bleeding. The arm had been broken about an inch and a half above the elbow; the stump had a very dreadful appearance; all the soft parts were in a contused and lacerated state, and the humerus was laid bare as high as the articulation, which was itself exposed. The skin and muscles were lacerated to a much greater extent, and in different directions. The remainder of the humerus was removed from the shoulder-joint by amputation, only as

much skin and muscle being left, as was sufficient to cover the wound. The child got completely well in two months.

In the second volume of the *Mémoires de l'Académie de Chirurgie*, is an account of a leg being torn away at the joint by a cart-wheel. The patient was a boy, about nine or ten years of age. This accident, like the foregoing ones, was accompanied with no hemorrhage. The lower portion of the os femoris, which was exposed, was amputated, together with such portion of the soft parts, as was in a contused and lacerated state. The patient experienced a perfect recovery.

The preceding cases strikingly confirm the observation, which I have already made, in regard to the little bleeding, which usually arises from contused and lacerated wounds.

In these instances, the pain is also in an inverse ratio to the cause of the accident: it is generally very severe, when the wound is only moderately contused; and, on the other hand, the patient scarcely suffers any pain at all, where there has been so violent a degree of contusion, as almost to destroy the organization of the nerves of the part.

When the bruised fibres have not been exceedingly injured, the part suppurates; but, such portions of the wound, as have suffered greater violence, inevitably die, and are cast off in the form of sloughs. Granulations are afterwards formed, and the breach of continuity is repaired by the process of cicatrization. (See *this word.*)

When a still greater degree of violence has been done to the parts, and, especially, when arteries of a certain magnitude have been injured, a mortification is too frequently the consequence. However, if the constitution is good, and the mischief is not too extensive, the case may still end well. But, in other instances, the event is always alarmingly dubious; for, the mischief is then not limited to the wounded parts, which have suffered the greatest degree of contusion; but, too frequently, extends over such parts, as were not at all interested by the wound itself.

The mortification, arising directly from the impaired organization of parts, is not what is the most alarming circumstance. The most dangerous kind of mortification is that, which is apt to originate from the violent inflammation, occasioned by the accident. This consequence demands the utmost attention on the part of the surgeon, who must let no useful means be neglected, with a view of diminishing the inflammation, before it has attained so high a pitch, as to induce fatal effects. He should not be afraid of letting the wound bleed a little, if it should be disposed to do so in the first instance. The edges of the wound should then be approximated with a few strips of sticking-plaster, so as to lessen the extent of the exposed surface: but, no sutures are proper. Not much of the wound can be expected to unite by the first intention; the whole, or the greater part of it, will necessarily suppurate, after the detachment of the sloughs. The surface will then granulate, new skin will form, and the part heal just like a common wound. Perhaps, until the sloughs have separated, the best application over the adhesive plaster is a soft poultice, which should be put on cold, lest it should bring on too great an oozing of blood. When, however, there is much bleeding, lint, and a simple pledget must be employed for the first few hours. The healing of a contused, or lacerated wound, is to be accomplished on the same principles, as the cure of sores in general. (See *Ulcers.*)

PUNCTURED WOUNDS.

A *punctured* wound signifies one, that is made with a narrow-pointed instrument, the external orifice of the injury being small and contracted, instead of being of a size proportionate to its depth. A wound, produced by the thrust of a sword, or bayonet, affords us an example of a punctured wound.

Wounds of this description are in general infinitely more dangerous, than incised ones, notwithstanding the latter have the appearance of being by far the most extensive. The greatest degree of danger, in cases of punctured wounds, always depends on the additional injury, and rough violence, which the fibres have suffered, besides being divided. Some of the disagreeable consequences, apt to follow, are also to be imputed to the frequent great depth, to which punctured wounds are liable to extend, in consequence of which circumstance, important parts and organs are often injured. These cases are likewise less easy of cure, owing to the difficulty of extracting any extraneous substances, which may happen to be lodged in the wound. All punctured wounds, and stabs are at the same time dangerous, inasmuch as they are particularly liable to be followed by a great deal of inflammation, fever, deep-seated abscesses, sinuses, &c.

A strange notion seems to pervade the writings of every systematic author, that all the danger and disagreeable consequences of punctured wounds are entirely

owing to the narrowness of the orifice, which prevents suitable applications to the bottom of such wounds. Hence, it is absurdly recommended to dilate the opening of every stab, with a view, as is generally added, of converting the accident into a simple incised wound. Some of these writers are advocates for making the dilatation with a cutting instrument, while others, with equal absurdity, advise enlarging the opening with tents.

Certain authors regard a punctured wound, as a recent sinus, and, in order to make the inner surfaces unite, they recommend exciting a degree of inflammation in them, either by means of setons, or injections.

In the *First Lines of the Practice of Surgery*, I have taken particular pains to expose the folly and error, which prevail in most writings on this part of practice. In the above work, I have remarked, that, certainly, if the notion were true, that an important punctured wound, such as the stab of a bayonet, is actually changed into a wound partaking of the mild nature of an incision, by the mere enlargement of its orifice, the corresponding practice would be highly commendable, however painful it might be. But the fact is otherwise; the rough violence done to the fibres of the body by the generality of stabs, is little likely to be suddenly removed by an enlargement of the wound. Nor can the distance, to which a punctured wound frequently penetrates, and the number and nature of the parts injured by it, be at all altered by such a proceeding. These, which are the grand causes of the collections of matter that often take place in the cases under consideration, must exist, whether the mouth and canal of the wound be enlarged or not. The time when incisions are proper, is, when there are foreign bodies to be removed, abscesses to be opened, or sinuses to be divided. To make painful incisions sooner than they can answer any end, is both injudicious and hurtful. They are sometimes rendered quite unnecessary, by the union of the wound throughout its whole extent, without any suppuration at all.

Making a free incision in the early stage of these cases, undoubtedly seems a reasonable method of preventing the formation of sinuses, by preventing the confinement of matter, and, were sinuses an inevitable consequence of all punctured wounds, for which no incisions had been practised at the moment of their occurrence, it would undoubtedly be unpardonable to omit them. Fair, however, as this reason may appear, it is only superficially plausible, and a small degree of reflection soon discovers its want of real solidity. Under what circumstances do sinuses form? Do they not form only where there is some cause existing to prevent the healing of an abscess? This cause may either be the indirect way, in which the abscess communicates externally, so that the pus does not readily escape; or it may be the presence of some foreign body, or carious bone; or, lastly, it may be an indisposition of the inner surface of the abscess to form granulations, arising from its long duration, but removeable by laying the cyst completely open to the influence of the air. Thus it becomes manifest, that the occurrence of suppuration in punctured wounds, is only followed by sinuses in cases, in which the surgeon neglects to procure a free issue for the matter, after its accumulation; or in which he neglects to remove any extraneous bodies. But, as dilating the wound at first can only tend to augment the inflammation, and render the suppuration more extensive, it ought never to be practised in these cases, except for the direct objects, of giving free exit to matter already collected, and of being able to remove extraneous bodies palpably lodged. I shall once more repeat, that it is an erroneous idea, to suppose the narrowness of punctured wounds so principal a cause of the bad symptoms, with which they are often attended, that the treatment ought invariably to aim at its removal.

Recent punctured wounds have absurdly had the same plan of treatment applied to them, as old and callous fistulæ. Setons and stimulating injections, which, in the latter cases, sometimes act beneficially by exciting such inflammation as is productive of the effusion of coagulating lymph, and of the granulating process, never prove serviceable when the indication is to moderate an inflammation, which is too apt to rise to an improper height. The counter-opening, that must be formed, in adopting the use of a seton, is also an objection. However, what good can possibly arise from a seton in these cases? Will it promote the discharge of foreign bodies, if any are present? By occupying the external openings of the wound, will it not be more likely to prevent it? In fact, will it not itself act with all the inconveniences and irritation of an extraneous substance in the wound? Is it a likely means of diminishing the immoderate pain, swelling, and extensive suppuration, so often attending punctured wounds? It will undoubtedly prevent the external openings from healing too soon; but cannot this object be effected in a better way? If the surgeon observes to insinuate a piece of lint into the sinus,

and pass a probe through its track once a day, the danger of its closing too soon will be removed.

The practice of enlarging punctured wounds by incisions, and of introducing setons, is often forbidden by the particular situation of these injuries.

In the first stage of a punctured wound, the indication is to guard against the attack of violent inflammation. When no considerable quantity of blood has been lost, general and topical bleeding should be practised. In short, the antiphlogistic plan is to be followed. As no man can pronounce, whether such wounds will unite, or not, and as no harm can result from the attempt, the orifice ought to be closed with strips of adhesive plaster, and gentle compression applied along the whole course of the puncture. Perfect quietude is to be observed. When the pain is very severe, opium is to be administered.

Sometimes, under this treatment, the surgeon is agreeably surprised to find the consequent inflammation mild, and the wound speedily united, by the first intention. More frequently, however, in cases of deep stabs, the pain is intolerable; and the inflammatory symptoms run so high as to leave no hope of avoiding suppuration. In this condition, an emollient poultice is the best local application; and, when the matter is formed, the treatment is like that of abscesses in general. (See *Suppuration.*)

POISONED WOUNDS.

Wounds of this description are not very common in this country. The stings and bites of certain insects; and the bites of vipers, mad dogs, cats, &c. are the only instances, which we meet with.

In this article, I shall dismiss from consideration the symptoms and treatment of the alarming indisposition arising from the bite of particular rabid animals, and content myself with referring the reader to *Hydrophobia.*

With respect to the stings of bees, wasps, hornets, &c. and the bites of gnats, and other insects, these cases are seldom of sufficient consequence to require the assistance of a surgeon. However, were his advice requested, he should be prepared to give it.

The hornet is, to appearance, the most formidable creature of the winged kind in Britain. Mr. Latta says, it is not to be met with in Scotland; though there are nests of them in some of the woods in England. The fact, however, is, that its sting, though more painful, than that of either the wasp or bee, is not attended with any material consequence. Wasps seldom sting, unless irritated by the destruction of their nest, and then they attack in great numbers every one who passes by. It is an error to suppose that bees sting more frequently; and that the human breath is particularly offensive to them. It has even been represented, as part of the secret of those, who make them swarm at pleasure, without danger to themselves, upon any part of their bodies, to keep their breath from them, as much as possible, lest they should thereby be provoked to sting them. Bees are, however, the most harmless of all creatures, if not touched or interfered with, and use their weapons only in their defence. The stings of all these insects are attended with a sharp pain in the part, very quickly succeeded by an inflammatory swelling, which in no long time goes off of itself. It may, however, be relieved, by rubbing the part, immediately after the injury, with honey, oil, vinegar, or spirits of wine, or even by immersing it in cold water. There are several other insects known to us, which do not fly, that seem to have something poisonous in their bite.

Were any material degree of inflammation to be induced by the irritation, occasioned by the bites and stings of insects, the best plan would be to keep the part continually covered with linen, wet with the saturnine lotion, and to exhibit one or two doses of some saline purgative.

With regard to the bites of serpents, those inflicted by the rattle-snake of America, and the cobra de capello of the East-Indies, are said to be the most speedily mortal. Indeed, writers state, that this is so much the case, that there is scarcely time to apply any remedy, although it be at hand the very moment, when the bite is received. Mr. Latta takes notice, that Mr. Catesby, in the Preface to his Natural History of Carolina, informs us, that the Indians, who, by their constant wanderings in the woods, are liable to be bit by those venomous animals, know, as soon as they receive the injury, whether it will prove mortal or not. If it be on any part at a distance from large blood-vessels, or where the circulation is not vigorous, they apply their remedies; but, if any vein, of considerable magnitude, happens to be hurt, they quietly resign themselves to their fate, as knowing that they could then be of no benefit. It is not well known what the remedies are, on which they chiefly depend. Seneka root and volatile alkali, are among the number; and, more particularly, strong doses of arsenic, as we shall have occasion to notice again.

Mr. Latta observes, that the only per-

son, who has particularly considered this subject, of the bites of serpents, is the Abbé Fontana. This latter gentleman agrees with Dr. Mead, that the poison of the viper is neither acid nor alkaline; but, denies that he could perceive in it any thing like salts, by means of a microscope, which Dr. Mead says he saw. He even denies, that it has any determinate taste when put upon the tongue; though Dr. Mead assures us, that both he and others, who had tasted it, felt it exceedingly sharp and burning to the taste; and he particularly takes notice, that one gentleman, who could not be satisfied without tasting a large drop undiluted with water, had an inflammation of his tongue, and the inside of his lips, of some continuance.

Mr. Latta remarks, that it is of no small consequence, towards the cure of such bites, to consider attentively the symptoms, which take place in the patient, whether they indicate any violent stimulus suddenly applied, in consequence of which, the person dies of an universal inflammation; or whether it operates, by suddenly checking the vital power, to such a degree, that it cannot be restored. From a vast number of experiments made by M. Fontana, he concludes, that the bite of an ordinary viper will not prove fatal to a full-grown person, nor even to a large dog, though it certainly will do so to smaller animals. Five bites from three strong and healthy vipers were not able to kill a dog weighing sixty pounds; and, as this dog was little more than a third part of the weight of an ordinary man, he concludes, that a single bite can never be fatal to an adult. In confirmation of this, he says, that he has seen a dozen of cases himself, and that he has heard of fifty more, only two of whom died. Concerning one of these cases he could get no information; the other perished of a gangrene, twenty days after the bite, and which began in three days after it, the bitten place having been deeply scarified almost immediately after the injury was received. Fontana believes, that much of the faintness, &c. which ensue upon the bite of a viper, are the mere effects of terror. "Upon a person's being bit, (says he,) the fear of its proving fatal, terrifies himself and the whole family. From the persuasion of the disease being mortal, and that not a moment is to be lost, they apply violent, or hurtful remedies. The fear increases the complaint. I have known a person, that was imperceptibly bit, in the hands or feet, and who, after seeing the blood, and observing a viper near him, has suddenly fainted away; one, in particular, continued in a swoon for upwards of an hour, until he was accidentally observed, and recovered out of it, by being suddenly drenched in cold water. We know, that death itself may be brought on by very violent affections of the mind, without any internal disease. Why may not people, that are bit, die from a disease, produced entirely from fear, and who would not otherwise have died from any complaint produced by the venom?"

Mr. Latta acknowledges, that M. Fontana has bestowed a great deal of attention upon this subject; but, he rightly contends, that the above reasoning is hypothetical and inconclusive. Mr. Latta owns, that some very timid, delicate, or nervous people might die from fear alone; but, he remarks, that it is by no means fair to conclude from thence, that the generality of people will do so. It is easy to see, that the bite of a viper must be more or less dangerous, according to circumstances. It depends on the creature itself, to throw out more or less of this poison; and the greater the rage is, into which it is thrown, the greater quantity it will throw out. If it has bitten any creature soon before it bites a man, the latter will be in less danger, because the quantity is but small. In like manner, when the person is bit through his clothes, they will absorb a quantity of it, and therefore the wound will also be the less dangerous: and the same thing must happen when only the small vessels are wounded; for then only a small quantity is likely to be conveyed immediately into the system. It must be otherwise, however, when the bite is inflicted upon a bare place of the body, and the poison is conveyed directly into a large vein; in this case, says Mr. Latta, it is quickly conveyed to the heart, and there can be little doubt, that it will very soon manifest its deleterious effects. Nay, M. Fontana himself informs us of a woman in Tuscany, who, though bit only in the little finger by a viper, fell into an hemiplegia, which could not be removed; and, Mr. Latta argues, that if such a violent disease could be induced by a wound inflicted at such a distance from the heart, we can have no reason to suppose, that, had the viper been large, and the poison quickly conveyed to the heart, that death would not have ensued.

Writers usually notice the following symptoms, as those which result from the bite of a viper:—1. A violent burning pain, with tension in the injured part. 2. The whole of the affected limb, and sometimes the whole body, become tense and inflamed in like manner. 3. The patient becomes extremely faint, the pulse low and feeble; he has a giddiness

in his head, nausea, and vomiting. 4. There is a fixed pain in the region of the heart. 5. The urine becomes tinged, of a deep yellow, the skin becomes yellow, like one who has the jaundice, and there is an evident diffusion of bile throughout the whole vascular system. 6. Cold sweats, with slight convulsive motions, ensue; and, if relief be not soon obtained, death is the consequence. These symptoms come on within twelve, or fourteen, hours after the bite, sooner or later, according to the violence of the injury; and the sooner they make their appearance, the more dangerous they are.

The medicines recommended for the bites of vipers are, according to M. Fontana, not only of very different, but even opposite, qualities. "In no country, (say he) through which I passed, could I ever find any two people or persons, bit by the viper, either in the mountains or valleys, that used the same remedies. Some used theriaca alone, either externally or internally applied; others common oil: a third set used stimulants, such as the strongest spirituous liquors; whilst others, on the contrary, tried every different kind of sedative. In short, there is hardly any active kind of medicine that has not been tried as a cure in this disease: while, at the same time, it is certain, that, under all the varieties of application, none of them died." Hence, our author concludes, that none of the remedies made use of had any effect in curing the disease; which, indeed, is by no means improbable, considering that many of them must have acted in a manner directly contrary. But this only proves that the bites of the vipers of Italy are not mortal. In a hotter climate, they certainly will be attended with more dangerous consequences. Hence, in the island of Malta, even in the winter-time, when the viper came out of the fire, no doubt enraged to the utmost degree, and fastened on the hand of the Apostle Paul, the people expected, that "he should have swollen, or fallen down dead suddenly;" whence we may see, that, in Malta, which is indeed very hot, the symptoms attending the bite of these creatures, were then extremely violent; and it was thought miraculous to escape death in consequence of it. And we have the most undoubted authority for believing, that, in America, as well as the East Indies, the bite of some serpents is attended with very speedy death. With regard to the cure of the bite of vipers, in such animals as were liable to be killed by it, our author says, from his own experience, that neither scarifications, nor even the excision of the part, are beneficial, but, on the contrary, hurtful. We may, indeed, readily conclude, that scarifications can do no good, because they do not tend to take away the poison, but rather to allow it more free access to the blood; but, we cannot so well say this of excision, if properly performed. Indeed, there can be no doubt, that it is a most prudent plan, when care is taken to make a complete removal of the parts as deeply as the bite extends. Fontana also found oil, volatile alkali, theriaca, &c. either useless, or absolutely hurtful, particularly the volatile alkali. The only thing, which he found of any avail, was the tying of a ligature round the bitten limb, to stop the progress of the blood towards the heart. This method, however, cannot prevent the poison from entering the mouths of the absorbents, nor from getting into the system, when the ligature is removed. The constriction of the limb might also bring on swelling, inflammation, and mortification, and it must evidently be inferior, in point of efficacy, to the careful excision of the bitten parts.

The practice of sucking the wound has been recommended to be employed very early; and, indeed, if it could be done with safety to the person who sucks, it affords some chance of success. Dr. Mead endeavours to shew, that it may be done with safety; but, Mr. Latta is altogether at a loss to account for the difference between this author and M. Fontana, concerning the taste of the poison; the former affirming, from his own experience, and that of several others, that it had a violent, hot, and fiery taste, as if the tongue was struck through with something burning, or scalding; while M. Fontana as confidently affirms, that it has no taste, nor raises any inflammation on the tongue. Dr. Mead relates, that, in a gentleman already mentioned, an inflammation was raised on the tongue, which did not go off in two days.

In treating this disease, Dr. Mead seems to lay considerable stress upon emetics; and, indeed, in all cases where the poison seems to be diffused through the body, this remedy has a chance of being useful, by relieving the extreme sickness and nausea, with which the patient is affected.

In cases of this kind, external applications can avail but little. Oil has been recommended; but, the trials made by Dr. Mead proved it to be insufficient. He seems to have some confidence in the fat of the viper itself; but, it is evident, that the success of this, or any other remedy of the kind, must depend entirely upon an accidental circumstance. It is not impossible, that, if any oily matter could get at the poison, it might so blunt

or soften it, that its deadly effects would be prevented; but, it is easy to see, that, by reason of the narrowness and depth of the wound, we have but a small chance of mixing it with the poison, after it has once been injected. Nevertheless, this has perhaps been sometimes done; and, thus, both oil olive, and viper's fat, have gained their reputation, though, in by far the greatest number of instances, they could be of no efficacy.

To complete the cure, Dr. Mead recommends the use of warm cordials, among which he mentions volatile sal-ammoniac, to produce a sweat, and seems, indeed, to insist upon these medicines as necessary for the recovery of the patient. Indeed, Mr. Latta thinks it probable, that the cure can only be accomplished by the exhibition of the very strongest cordials. He approves of applying a ligature; but, I would advise excision of the parts. He also speaks in favour of trying wine, bark, and vegetable acids.

Dr. Temple directs the use of *caustic volatile alkali* and *eau de luce*, as specifics against the bite of the viper, in the following way:

℞. Alkal. volatil. caust. gutt. XL. in quovis vehiculo sumend.

℞. Sp. ammoniæ succinat. (*vulgò* eau de luce) gutt. XL. quovis vehiculo sumend.

This, he observes, should be given as soon as possible, after the accident, repeating the dose in five minutes, and also embrocating the parts well with it.—(See *Catesby's History of Carolina. Mead on Poisons. Fontana on the Venom of the Viper. Latta's System of Surgery, Vol.* 3.)

Mr. Chevalier was induced to recommend the trial of arsenic in these cases from the facts recorded in Dr. Russell's History of Indian Serpents, on the authorities of Mr. Duffin and Mr. Ramsay, and from which it appears, that the Tanjore pill, of which arsenic is in all probability the chief ingredient, is exhibited with considerable success in India after the bites of venomous serpents.

Mr. Ireland, surgeon to the fourth battalion of the sixtieth regiment of foot, had formerly heard Mr. Chevalier recommend the trial of arsenic for the bites of serpents, and he was resolved to make the experiment whenever an opportunity offered. On his arrival in the island of St. Lucia, he was informed, that an officer and several men, belonging to the sixty-eighth regiment, had died from the bites of serpents, supposed to be the coluber carinatus of Linnæus. Mr. Ireland also learnt, that every thing had been tried by the attending medical men to no purpose, as all the patients had died, some in six, and others, in about twelve hours, from the time of their receiving the wound.

A case, however, soon came under Mr. Ireland's own observation, and, as nothing, that had been done before, seemed to have been of any service, he was determined on giving arsenic a full trial.

"Jacob Course, soldier in the York light infantry volunteers, was bitten in the left hand, and the middle finger was so much lacerated, that I found it necessary to amputate it immediately at the joint with the metacarpal bone.

"I first saw him about ten minutes after he had received the wound, and found him in a torpid senseless state: the hand, arm, and breast of the same side were much swelled, mottled, and of a dark purple, and livid colour. He was vomiting, and appeared as if much intoxicated. Pulse quick and hard: he felt little or no pain during the operation.

"The wound being dressed, and the patient put to bed, I ordered a cathartic clyster, and the following medicine to be taken immediately. ℞. Liquor. Arsenic. ℥ij. Tinct. Opii gt. x. Aq. Menth. Pip. ℥iss; which was added to half an ounce of lime juice, and as it produced a slight effervescence, it was given in that state: this remained on his stomach, and was repeated every half hour for four successive hours. In the mean time, the parts were frequently fomented with common fomentation, and rubbed with a liniment composed of Ol. Terebinth. ℥ss. Liquor. Ammon. ℥ss. and Ol. Oliv. ℥iss. The cathartic clyster was repeated twice, when the patient began to be purged; and the arsenical medicine was now discontinued. He had become more sensible when touched, and, from that time, he gradually recovered his faculties; he took some nourishment, and had several hours sleep.

"The next day, he appeared very weak, and fatigued; the fomentation and liniment were repeated. The swelling diminished gradually; the natural colour and feeling returned, and, by proper dressings to the wound and attention to the state of his bowels, he soon recovered and returned to his duty."

Mr. Ireland recites about four other examples, in which arsenic was exhibited with similar success.

It deserves particular notice, that the liquor arsenici employed by Mr. Ireland was prepared according to Dr. Fowler's prescription, which directs sixty-four grains of arsenic, and as many of the fixed vegetable alkali, to be dissolved in a sand heat, and the solution to be made an exact pint, so that two drachms con-

tain one grain of arsenic in solution. (See *Medico-Chirurgical Transactions, Vol.* 2, *p.* 393, *&c.*)

The best doctrines, relative to wounds in general, are those contained in various parts of *A Treatise on the Blood, Inflammation, &c. by John Hunter.*

WRY-NECK. (*Torticollis.*) An affection, in which the head becomes inclined to one side. The ancient writers have taken no notice of the disorder. Some of the modern ones have termed it *caput obstipum;* a word, indeed, which has been employed by the best Latin authors, to denote the affliction about to be considered. The wry-neck should be discriminated from the tension and stiffness of the neck, occasioned by a rheumatic affection of this part, and also from the faulty position of the head, arising from deformity in the cervical vertebræ.

Tulpius, who was a learned physician at Amsterdam, about the middle of the seventeenth century, gives an account of the cure of a boy, twelve years old, who, from his earliest infancy, had had his head drawn down towards the left shoulder, by a contraction of the scalenus muscle. Fomentations had been applied in vain, with a view of relaxing the parts, the stiffness and corrugated state of which seemed to produce the disorder. Steel-collars also proved ineffectual in bringing the head into a right posture. Tulpius had a consultation with two other skilful physicians, about the case, and it was decided to put the boy under the care of an eminent surgeon, of the name of Minnius, who had performed several operations with success in similar instances. He first made a large eschar by applying caustic, and then with a knife divided the muscle, which drew the head to one side. Tulpius, who has left only a very confused account of the operation, observes, that it was performed with great slowness and circumspection, for fear of wounding the carotid artery, and jugular vein.

The author expresses his disapprobation of this manner of proceeding, and advises such persons, as will run the risk of doing so dangerous an operation, not to make any preliminary application of caustic. The latter measure only caused useless pain, and could not possibly be of any service. Tulpius also recommends the operation not to be done by little and little, at repeated times; but, to make a complete division of the muscle at once, with the necessary degree of caution.

Meckren, a surgeon at Amsterdam, who has published a valuable collection of medico-chirurgical cases, also treats of the operation applicable to the wry-neck. He states, that he had seen it performed on a boy, fourteen years old. The tendon of the sterno cleido-mastoideus muscle was divided with one stroke of a sharp pair of scissars, and in a very skilful manner, by a surgeon named Flurianus, and as soon as the incision was made, the head took its right position. The author has also noticed the remarks made by Tulpius, relative to the plan of operating.

On approaching nearer to modern days, we find, that the celebrated Mr. Samuel Sharp considered the wry-neck as mostly arising from a contraction of the sterno-cleido-mastoideus muscle. He has proposed dividing this muscle, whenever the disorder seems to proceed from the kind of cause, which we have just now mentioned. However, he makes an exception, in regard to those cases, in which the affliction has existed a considerable time, and, particularly, in instances, in which it has prevailed from infancy. He remarks, that it would be impossible to rectify the position of the head, if the cervical vertebræ should have grown in a distorted direction. The following is the operation, which this author recommends to be done in proper cases. After placing the patient on a table, a transverse incision is to be made through the skin and fat, of a size somewhat more extensive, than the breadth of the muscle, and about one-third of its length from the clavicle. A probed-razor is then to be passed underneath the muscle, and to be drawn out, so as to make the requisite division of the part. After the incision was made, Mr. Sharp recommended the wound to be filled with dry lint, and to be always dressed in a way, that would keep the extremities of the muscle from growing together again. For this purpose, he advised the cut ends to be separated from each other as much as possible, by the assistance of a bandage to support the head, during the whole time of the cure, which, he says, will generally be about a month. (See *Treatise on the Operations of Surgery, chap.* 35.)

According to Mr. Sharp's account, the operation above described, ought to be a very common one. However, if attention be paid to the nature and causes of the disease, and to the differences, resulting from whether the disorder be recent, or of long standing; constant, or periodical; idiopathic, or sympathetic; dependent on spasm, or merely on paralysis of the antagonist muscles; and, lastly, if it be recollected, that the affection may be produced by other muscles, besides the sterno-cleido-mastoideus; we shall find, that cases, in which the foregoing operation

can be judiciously undertaken, are not so very frequent.

With regard to the manner in which Mr. Sharp operated, Mr. B. Bell conceived, that it was attended with hazard of wounding the large blood-vessels. But, though it seems to me better to use a probe-pointed bistoury and a director, than the kind of razor, which Mr. Sharp employed, I do not coincide with Mr. B. Bell in thinking, that the latter surgeon's plan was at all objectionable on the score of danger, in respect to wounding the vessels. Perhaps, some might think Mr. B. Bell's method most likely to injure the large vessels; for, he advises the operator to cut the muscle from without gradually inward, as deeply as seems necessary.

The most prudent method of operating, in my opinion, is first to divide the clavicular portion of the contracted muscle, near the clavicle, and even to cut out a sufficient piece, to remove all chance of the two ends uniting again. This step would weaken the muscle considerably, and, perhaps, might answer every purpose. It could easily be accomplished, by means of a director, and curved bistoury, after making the requisite division of the skin with a common scalpel. Were this proceeding only to produce a partial amendment of the wry-neck, the operator might then venture to divide the sternal portion of the muscle. A director should be passed under it, and the division made with a probe-pointed curved knife.

Although the wry-neck may occasionally depend on a contraction of the sterno-cleido-mastoideus muscle, this case is far from being very frequent. The deformity is much oftener owing to some affection of the integuments. M. Louis often divided with success contractions of the skin, which had kept the head drawn to one side for many years, and had been occasioned by burns. He remarks, that he has met with contractions of this kind, which might have been mistaken for a part of the sterno-cleido-mastoideus itself.

Mr. Gooch has related a case of wry-neck, which was caused by a contraction of the platysma myoides muscle. The patient was a young gentleman, fourteen years of age, who appeared to have always enjoyed very good health in every other respect. He had had his head, for several months, strongly drawn to one side by a constant contraction of the platysma myoides muscle, which had become exceedingly rigid, especially just where it is inserted at the basis of the jaw, and it made the skin, from the angle of the os maxillare inferius to the chin, seem like the cicatrix of a burn. The same side of the face, quite from the point of the chin, was much shrunk, and distorted by the contraction of the muscle, and the corner of the mouth, in particular, was so drawn to one side and downward, when the patient turned his head, that a vast deal of deformity was the consequence. From the inferior part of the eye-brow, at the internal angle of the eye, to near the top of the head, there was a kind of furrow upon the skin, about half an inch broad, having a shining, polished appearance, like the cicatrix of a wound, and destitute of hair, which had fallen off. From the corner of the eye downwards, there was the same kind of appearance in a less degree. The patient was subject to repeated attacks of spasms, which began at the insertion of the muscle, and terminated at the eye, attended with a great deal of pain. The ear, and, also, the temporal and frontal muscles, were sometimes affected in a similar manner. The parts, in the course of the insertion of the muscle into the jaw-bone, were considerably thickened, without being in the least inflamed externally, and they were only a little painful, when touched, except they were at the same time stretched. The subjacent muscles did not seem to be at all affected.

It appears from the account, given by Mr. Gooch, that, in the treatment of this affection, every known means had been tried, by the advice of the most eminent practitioners; but, without effect. Mr. Gooch determined to try what benefit would be produced by dividing the muscle in the situation of the disorder. He first divided the integuments a little below the jaw, and thus exposed the whole breadth of the platysma myoides muscle, the fibres of which seemed to be in a state of violent extension, especially, when the patient's head was inclined towards the opposite side. Mr. Gooch then divided the muscle completely across, by a very careful dissection, until he had brought into view the fasciæ of the muscles underneath. The patient was then directed to turn his head towards the opposite side, and Mr. Gooch had the satisfaction of observing, that the patient could perform this motion, without his face, and corner of his mouth being affected, as they had been before. The wound was treated in the ordinary way, and no particular symptoms arose. As soon as the inflammation had subsided, the patient was directed to move his head about very frequently, in order to prevent any kind of stiffness, which might ensue, in consequence of the contraction of the muscular fibres, and inelasticity of the cicatrix.

The patient found himself perfectly relieved by the foregoing operation, and had

no return of the painful spasms, to which he had been previously subject. The side of his face, however, never recovered the proper degree of plumpness.—(*Chirurgical Works of B. Gooch, Vol.* 2, *p.* 81.)

Whenever an attempt has been made to cure a wry-neck, by dividing any of the muscles, or merely the integuments, it becomes necessary to take some measures for keeping the head in a proper position, during the treatment of the wound, lest, in consequence of the head inclining in the direction, in which it was before the operation, the divided parts should immediately grow together again, and bring the patient almost into the same condition, as he was before any thing had been done. With a view of preventing this unpleasant circumstance, Mr. Sharp recommends filling the wound with lint, and making it suppurate. Mr. B. Bell, on the other hand, advises the employment of a proper machine for keeping the head in a due position. Some writers think the use of a bandage quite sufficient for the purpose. Perhaps, as prudent a plan as any, when the sterno-cleido-mastoideus is affected, is to cut out a certain portion of it. (See *Sharp's Treatise on the Operations of Surgery, chap.* 35. *Chirurgical Works of B. Gooch, Vol.* 2, *p.* 81. *B. Bell's System of Surgery. Encyclopédie Méthodique, Partie Chirurgicale, Tom.* 2, *Art. Torticollis.*)

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